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TEN YEARS' PROGRESS IN LAKE SHIPS.

THE MATOA OF 1890 AND THE JOHN W. GATES OF 1900—ONE CARRIED 2,500 AND THE OTHER 7,000 GROSS TONS.

The steel steamer Matoa of the Minnesota Steamship Co.'s fleet, operated by Pickands, Mather & Co. of Cleveland, represented in 1890 the largest type of carrier on the great lakes. She was built in that year by the Globe Iron Works Co. of Cleveland. Her registered tonnage, gross, is 2,311 and she is 290 ft. long, 40 ft. beam, and 21 ft. depth of hold. The draught of water through connecting channels of the lakes in 1890 averaged 15 ft. 6 in. and on that draught the Matoa's average cargo of ore was about 2,500 gross tons. The average loading time at upper lake ports for such a vessel as the Matoa in 1890 was about fifteen hours, and the average time at Lake Erie ports, unloading, about thirty-six hours.

The John W. Gates, built at the Lorain works of the American Ship Building Co. last winter, is the largest type of lake freighter today. The J. J. Hill, William Edenborn and Isaac L. Elwood are vessels that are in all respects similar to the Gates. They have all been in service during the past season. The Gates is just a trifle (less than 2 ft.) short of 500 ft. length. Her beam is 52 ft., depth of hold 30 ft., and gross tonnage 5,085. Her average cargo for the past season was practically 7,000 gross tons on a draught of 17 ft. 10 in., which is about the average draught of the rivers for the season; loading time 15 to 26 hours, average unloading time about 43 hours.

THE LAKE FREIGHTER OF 1890 AND OF 1900.

	Steamer Matoa of 1890.	Steamer John W. Gates of 1900.
Length over all, ft.	290	500
Beam, ft.	40	52
Depth, ft.	21	30
Registered tonnage, gross	2,311	5,085
Draught of water in channels, ft.	15½	17¾
Average cargo, gross tons	2,500	7,000
Average loading time, hours	15	20
Average time unloading, hours	36	43

Some vessel owners are of the opinion as regards time required for loading and unloading that the progress is not as marked as in the capacity of vessels. The docks have probably not kept pace with the deeper channels and the achievements of the ship builders. It is also true that the labor organizations are in some respects responsible for a change of conditions since 1890 that interfere with dispatch to vessels.

A comparison similar to that just made regarding the loading and unloading of ore cannot be made in the soft coal trade. The car dump machines have come into use since 1890. Under the old method of shoveling from cars to buckets three or four days would be spent in taking on a cargo of 2,000 to 2,500 tons. With the machine that dumps the entire car a cargo of 4,000 to 5,000 tons is often loaded in a single working day.

BUYING UP THE WOODEN VESSELS.

Mr. J. C. Gilchrist of Cleveland, who has eight steel steamers of about 5,000 tons capacity each under construction in different yards of the American Ship Building Co., is evidently trying to gradually acquire control of the wooden vessels of the lakes, especially those of 2,000 to 3,500 tons capacity which are needed in the coal trade and in moving ore cargoes of medium size. No wooden vessels are being built to take the place of those lost each year, and the vessels of medium size are most desirable in the coal trade. This is undoubtedly the reason for Mr. Gilchrist's present move, although it is not probable that he will enter into the undertaking in a way that will cause him to pay fancy prices for the ships. During the past few days he has bought four wooden vessels—the steamers Helena and Neosho from the Milwaukee Tug Boat Line, the schooner Magnetic from the Republic Iron Co. of Cleveland, and the steamer Volunteer from the estate of Capt. Thomas Wilson. For the Helena and Neosho $125,000 was paid. In addition to the new steel fleet which he is building, Mr. Gilchrist now has twenty-six wooden vessels. He will increase his office force and will employ a shore captain and engineer. Capt. J. L. Weeks, who sailed Gilchrist vessels for a great number of years, has been engaged for the position of shore captain. The shore engineer is Mr. James Mitchell, who has also been in the Gilchrist employ for a long time past.

FORECAST OF THE NAVAL REGISTER.

Of especial interest to the country and the navy is the forthcoming naval register for the year 1901, which is being prepared under the direction of Rear Admiral A. S. Crowninshield, chief of the bureau of navigation. It will show the remarkable growth of the navy during the past century. From a few officers and still fewer ships, the navy has grown to a total of 1,838 commissioned officers, 17,500 enlisted men, 2,500 apprentices and 232 ships of all classes, with sixty-one under construction. The new register will also present the name of an officer bearing the rank of admiral of the navy, while the highest grade of the navy of 1800 was that of commodore. The senior officer of the navy is still Admiral George Dewey. The senior rear admiral is Rear Admiral J. A. Howell, and the junior rear admiral is Rear Admiral J. J. Read. Capt. M. L. Johnson is the ranking and Capt. John Jacob Hunker the junior captain. Com. Franklin Hanford heads the list of commanders, and Com. D. W. Mullan, who was suspended in 1897 for five years, retains his place at the foot of the list of commanders. Theodoric Porter is the senior lieutenant commander, and John G. Quinby is at the foot of officers of this rank. Lieut. J. H. Glennon is the senior officer of his grade, and J. R. Pringle holds position at the foot of the lieutenant list. B. B. McCormick is the leading lieutenant, junior grade, and F. H. Dunn the last of this grade. T. D. Parker is the senior ensign.

In the staff corps Medical Director W. K. Scofield has the distinction of being the senior medical officer, Pay Director C. H. Eldredge the senior pay officer, Chaplain W. O. Holway the senior chaplain, W. W. Hendrickson the senior professor of mathematics, Rear Admiral Philip Hichborn the senior chief constructor and P. C. Asserson the senior civil engineer. During the past year there have been sixteen resignations, thirty-seven retirements, thirty-three deaths, one cadet discharged, one cadet dropped and two naval cadets dismissed. In the marine corps there have been two retirements and two deaths. The list of dead contains the names of such gallant officers as Rear Admirals J. W. Philip and F. V. McNair.

While compared with foreign services, the material of the navy is small, it has as high a position as the ships of 1800 had established for themselves after their battles with the French and the Tripolitans. The battleships in commission number seven—Alabama, Kearsarge, Kentucky, Iowa, Indiana, Massachusetts and Oregon—and this number is shortly to be increased by the addition of two other vessels of this class, the Wisconsin and Illinois. The armored cruisers number two, the Brooklyn and New York; the protected cruisers fourteen, including the Columbia and Minneapolis, laid up in ordinary; Olympia, San Francisco, Baltimore, Cincinnati, Raleigh and Boston, undergoing reconstruction, and Chicago, Philadelphia, Newark, New Orleans, Albany and Atlanta in commission; the second-class battleship Texas, six modern monitors and many unprotected cruisers, gunboats, converted cruisers, torpedo boat destroyers, torpedo boats, tugs, colliers, training ships and receiving ships.

FEDERATION OF LAKE SEAMEN.

Although the annual meeting of the Lake Carriers' Association in Detroit is close at hand (Jan. 16 is the date), there is little talk of the presidency. It is an honor highly regarded by the vessel men but never sought openly. J. G. Keith of Chicago, A. W. Colton of Toledo, Robert R. Rhodes and H. W. Hawgood of Cleveland have all been mentioned for the place. It is now more than probable that the attention of the Detroit meeting will be devoted largely to a proposition involving the establishment of a federation of seamen. The executive committee has had in hand for several days past a long petition from men employed aboard the vessels asking for co-operation in the formation of such an organization. The idea was very probably suggested through the success of a similar organization formed some years ago in England and which now has many thousands in its ranks. Men from salt water holding cards of membership in the European federation came to the lakes and told of its operations. The great advantage of the proposed federation is its insurance features, which will provide for weekly payments in case of accident, liberal allowance on account of total disability, etc., and this at a very low monthly charge to the men, on account of the proportion of these benefits to be borne by the employers. The return to the vessel owners will consist, of course, in securing a better class of labor, as membership in the organization and issuance of certificates would be safeguarded by rules relating to efficiency, sobriety, etc. The executive committee of the Lake Carriers is now consulting experts in insurance lines, especially those who have had experience with similar organization. It is hoped that the details of the organization may be worked out in time for the annual meeting.

NOTES FROM SHIP YARDS OF THE GREAT LAKES.

As the ship yards of the great lakes are provided with new work that will keep nearly all of them engaged for seven or eight months to come, no new orders are looked for just now, although it is said that the American Ship Building Co. may bring its list up to thirty-three steel ships by a contract for a package freight steamer that has been hanging fire for a long time past and which it is now thought will be closed. Four large freighters are being launched within the present week. Their places will of course be taken by keels for vessels that have been under order for some time past. On Saturday last there was launched at the Chicago yard the first of the four Counselman steamers. These are the vessels of Canadian canal dimensions which are expected to engage in trade between Chicago and European ports. The first of these ships was named Northwest. A second of the 5,000-ton Gilchrist freighters, named Saturn, was launched at the Lorain yard Wednesday, and it is expected that one of the two steel tow barges building at West Bay City for D. R. Hanna and others of Cleveland will be launched today (Thursday). On Saturday, at the Globe yard, Cleveland, a 6,000-ton steel steamer building for the Cleveland Steamship Co. (John Mitchell and others) will be launched.

Mr. Robert Curr, who is well known among ship builders and ship owners of the lakes on account of his work for owners and underwriters, looking after their interests in the construction and repair of steel vessels, will shortly go to San Francisco to take the position of superintendent at the new plant of the Risdon Iron Works. Mr. Curr leaves with the best wishes of everybody with whom he has had any dealings on the lakes. His advancement from hard work in a ship yard has been by his own effort. He is practical, industrious and ambitious. He will visit the principal eastern ship yards and the manufacturers of tools before starting for the Pacific coast.

Mr. B. W. Parker of Detroit, manager of the White Star line of steamers, is making preparations for the construction of a steel freight and passenger steamer for the Toledo-Port Huron service, but the contract may not be let for several months. The vessel is not required at once, and the order will be held up in the hope of securing better prices later on than could now be had from the ship builders.

SECRETARY LONG SPEAKS IN BOSTON.

MAKES AN ADDRESS IN WHICH HE PRAISES THE STATE DEPARTMENT AND TOUCHES MODESTLY UPON THE NAVY.

Hon. John D. Long, secretary of the navy, was the guest of honor at a dinner given by the Boston Commercial club, on last Saturday night. The speech which he made upon that occasion was received with the greatest enthusiasm. Among many things he said:

"I very much appreciate the courtesy of the Commercial club. I certainly have deserved nothing at its hands. I am a junior member, and most of the time of my membership have been unable, on account of my duties at Washington, to attend its meetings. I do not forget, however, the men who compose it, and who represent the business enterprise, growth and commercial inspiration of Boston, and so of the universe, of which Boston is the hub. Nor is it any limited part of the world's progress which you represent. Commerce is only another name for civilization. This is the season of the year when we celebrate the landing of the Pilgrims, whom we always associate with the idea of a religious exodus, whereas, in fact, their venture was largely a commercial one, with a view to developing the resources of the new world and of profiting by an exchange of its products with those of the old. It was a merchant who furnished the funds for the undertaking and but for whom it is doubtful if it would have had the start it had. That the Pilgrims were good business men is shown by the fact that in a few years they bought out their promoters and carried the enterprise to success on their own footing. They were expansionists, reaching well out from their own borders, and for a century or two later no man crossed the ocean oftener than Winslow, their minister plenipotentiary, who looked after their interests abroad. It is an interesting fact that nearly 300 years later we, their descendants, not in the little Mayflower, but in the great ocean steamers of today, are returning across the sea to plant on the shores of the oriental isles the institutions which they planted here. It is by the growth and expansion of commerce that Japan, that now magnificent empire opened to the world by the American navy, has suddenly sprung into the circle of the world's great powers—a marvelous and unlimited hive of industry, activity and national force. The recent unhappy tumult in China is only the effervescent accompaniment of the bursting of the seclusion of that uncounted people; and its commercial relation with the world at large, so recently enlarged to us by the admirable administration of Secretary Hay, will in the coming century bear fruit in an interchange of agricultural and manufactured products such as even the imagination cannot now picture. It is enough, however, to recognize what the commercial spirit has done in our own country. It has enabled the farmer to put not fields but territories under cultivation, and supplied him with the means to gather his crops and take them to market. It has distributed the products of the farm and mine and manufactory and brought to all classes that common use and enjoyment of the fruits of labor which is the true wealth of a nation.

"It is interesting in this closing hour of the century to compare the commerce of the world in 1800, which was something like $1,500,000,000, with its commerce in 1900, which is something like $20,000,000,000. In 1800 the commerce of the United States was $162,000,000; during the last year $2,200,000,000. The commerce of Boston alone is far more today than the whole commerce of the United States in 1800. Great Britain alone exceeds the United States in the extent of its commerce, and we are rapidly overhauling her. The export of Germany is $300,000,000 less than ours, and France nearly $500,000,000 less. During the period in which the export trade of Great Britain in manufactured articles has doubled, that of the United States has grown elevenfold.

"It has been assumed that our tariff policy, building up home manufactures and excluding foreign competition, would be a barrier to our own competition for the world's purchase of manufactured goods; but this assumption has not been confirmed. At first our shipments abroad were few and experimental, and largely in specialties, like sewing machines. Later it has been found that even in European countries American goods find easy competition with foreign of the same sort. The American shoe has literally stepped into England and Germany and found there a purchaser who has awakened to its superiority and prefers it. Instead of now looking to non-manufacturing countries for our customers we find them in the older industrial nations of Europe. I learn from the bureau of foreign commerce in the state department that in machinery of all kinds, labor-saving implements, furniture, boots and shoes, railroad, bridge and other building supplies, hardware and a great variety of other classes of iron and steel the American is in the lead, and that one can hardly pick up a foreign newspaper without finding in it some reference to a new encroachment by American ingenuity and enterprise upon the more conservative activities of the old world. With the table of the German supplied from America, with the pretty woman of France dressed in American silk, with the British cutler of Sheffield buying an American knife and the British ironworker using American machinery we may next expect that we shall soon be actually carrying American coal to Newcastle.

"It is not for me to speak for other departments than my own, but I cannot forbear suggesting at this time how much we are indebted to the work of our state department, the present head of which, Mr. Hay, has, I believe, earned for himself a place in the gratitude, as he has already a place in the honor, of the American people. Usually the individual leads and the government follows. In this case, however, while our manufactories have been absorbed in production, the consular officers of the state department stationed abroad have by their activity in reporting trade conditions aided largely in turning our surplus products into foreign channels. In this connection it is fair to say a good word for our consular service. It has its defects, and it is the fashion, not unwarranted, to urge their reform. And yet its officials, without special previous training or experience, and chosen from the general body of the public, have been marvelously quick and efficient in pointing out not only the opportunities but the hindrances to an increased commerce and adding in the establishment of trade, furnishing not only general information but minute details, and accomplishing so much that foreign nations, especially Great Britain and Germany, awaking to our outstripping them, have recently taken steps to give a more practical character to their consular reports and to insure their speedier publication. At the very outset of the present administration the importance of this service was recognized and steps taken to still further facilitate the commercial publications of the department of state and to print and distribute them more promptly for the benefit of the business community. Instead of their issuance once a month, they are now printed and distributed daily, so that the manufacturer and exporter, the press, the chambers of commerce and boards of trade have continuous trade information from every part of the globe, sometimes by cable, with the least possible delay. The bureau of foreign commerce tells me that they are all the time in correspondence with every part of the country, answering inquiries as to trade conditions, customs, duties, the demands for particular kinds of goods, and the whole range of information pertaining to the export trade.

"And now may I, with all modesty, say that the navy is not without its title to credit. It has led the way as in Japan. It has made the flag respected. It is rapidly developing into proportions which will enable it to be the safeguard and help of the mighty international commerce that is coming. As our products go abroad all over the globe, as our ships carrying them sail every water, as we are gradually drawn into closer commercial activity with the world, there will be increased necessity for the resources of diplomacy, and with these the backing and moral prestige of a corresponding naval strength. I trust it is not to be anticipated that in the better conditions of the future a great foreign trade once built up will be at the risk of any power inclined to obstruct or impair it, but if so, there will be no danger so long as the American navy is animated by the spirit of the American sailor and backed by the heart of the American people."

SIX-MASTED SCHOONER CREATES A SENSATION.

The first six-masted vessel that has been in the port of New York since the colossal marine failure, the Great Eastern, steamed past the Hook, arrived last Saturday with all her gleaming muslin furled, in tow of the tug John Nichols. She is the George W. Wells, and her skipper, Capt. John G. Crowley, who is also her chief owner, is immensely proud of her performance. She is a clipper without a doubt, and Capt. Crowley thinks that what she has done is merely a shadowy indication of what she may do when the weather is "a-fittin' and a-suitin'." She sailed from Philadelphia for Havana on Nov. 14, taking a tow to the Delaware breakwater. She got into the open next day and six days later, almost steamship time, she landed in Havana the biggest cargo of coal ever discharged from a single craft of any rig. She couldn't find anything in Havana worth while bringing to the states, so she sailed in leisurely fashion, getting becalmed several times, for Brunswick, Ga. There she found a cargo of 46,000 yellow pine crossties awaiting shipment to Weehawken for the Erie railroad, which paid $25,000 for them. Capt. Crowley had made good money in his coal-carrying project and he made some more bringing the ties here. The sea was kind to him and the breezes were mostly abeam or on the quarter, after he pulled out of Brunswick. When he sighted the Nichols, or when the Nichols sighted him off the Hook, he was just three days and twenty-three hours out. That is pretty near to the sailing record from Brunswick and is less than a day slower than the winter run of the Mallory steamers from Georgia.

Capt. Crowley didn't hesitate to say that his latest voyages had been profitable as well as wonderfully swift. A fleet of tugs was looking for the six-master, the pilots knowing that she would be a prize. The Nichols got her after some haggling as to the price of the tow. The Nichols couldn't afford to haggle long, as there were other little giants in sight waiting for a chance to bid. She created a sensation, even with her canvas invisible, as she was towed up the North river. Tugs uproariously screeched greeting to her and the ferryboat passengers crowded to the rails to see her pass. Somebody asked the skipper what he called her masts and he said that he didn't know what the rule was, but that he had decided arbitrarily, as becomes a real Yankee skipper, that the first mast would be called the fore, the second the main, the third the mizzen, the fourth the spanker, the fifth the jigger and the sixth the driver, and that if other fellows with six-masted fore and afters didn't like the designations they might call 'em what they pleased or go further.

JAPAN AS A MARITIME NATION.

Japan now stands tenth in the list of maritime nations, having the precedence of both Holland and Denmark. She occupies this position by virtue of her aggregate steam and sailing fleets, when compared with the combined fleets of other nations. But if only the steam fleet is taken into consideration, Japan holds the fifth rank. At the end of last year the Japanese flag covered 471 ocean steamers, measuring altogether 484,000 register tons, so that, in this respect only England, Germany, the United States and France, stand before her. Of these 471 steamships, 126, measuring about 260,000 tons, were owned by three companies which are carrying on a hot competition with the other maritime nations of both Europe and America. These three are the Nippon Yusen Kaisha, the Osaka Shosen Kaisha, and the Toyo Kisen Kaisha. The first-named of these, which has its headquarters at Tokio, possesses a nominal capital of £2,300,000 and works with sixty-eight steamers, of nearly 200,000 tons register. It paid, for the past year, a dividend of 9½ per cent.. The steamers of the company perform the following services: The European line from Yokohama to Marseilles, London and Antwerp; Bombay line from Yokohama to Colombo and Bombay; Australian line from Yokohama to Manila and Sydney; American line from Hong Kong, Kobe and Yokohama to Seattle; from Yokohama to Shanghai; from Kobe to Vladivostock; from Kobe to Newchwang; from Kobe to Tientsin; from Kobe to Chi-nan-po; and between Shanghai, Chifoo and Tientsin. Besides these services, this company runs steamers between several places on the Japanese coasts, and to Formosa. The Osaka Shosen Kaisha, which has its headquarters at Osaka, has a capital of £575,000 (which is about to be doubled), and owns fifty-five vessels aggregating about 42,000 register tons. Thirteen of these are steamers of over 1,000 tons register. The last dividend paid by this company was 8½ per cent. Its vessels work for the most part in the Japan coasting trade, but some of them run between Japan, North China and Corea, and others between Formosa and South China. After the capital has been increased, oversea lines of steamers to Europe, India and Australia, will be organized. The Toyo Kisen Kaisha has its headquarters at Tokio; works with a capital of £625,000, and possesses three steamers, each of 6,000 tons register, which keep up a regular communication between Hong Kong, Shanghai, Kobe, Yokohama and San Francisco. It is worthy of note that the subsidies granted by the Japanese government for the year 1900-1 in aid of these and some smaller shipping companies amount to £800,000.—Syren and Shipping.

ATLANTIC AND PACIFIC COAST BUILDERS.

A NUMBER OF NEW CONTRACTS ARE TO BE NOTED—FORE RIVER ENGINE CO. MOVES ITS PLANT—SHIP YARD ITEMS.

The wooden schooner George C. Thomas, launched recently, is the third which McKay & Dix have built at Bucksport, Me., during the past year. The Thomas is an exact counterpart, except in a few details, of the schooner Edward T. Stotesbury which was launched from the yard on Oct. 11, and is now about due in Liverpool with a cargo of naphtha from Philadelphia. Her frames were got out on the same molds as the Stotesbury and the difference in measurement is very slight. Her dimensions are: Length, 210; beam, 41.6; depth 21.6; gross tonnage, 1,447; net tonnage 1,280. Her masts are handsome sticks of Oregon pine 108 ft. long, shipped in the rough across the continent by rail from Seattle to Bucksport. Her standing rigging is of steel, surprisingly small but of great strength, and set up by ponderous iron turn-buckles, and double spring stays between all the masts. She carries her head gear on an immense "spike" bowsprit and is painted a bright bottle green. A feature of her construction is the use of a heavy wrought iron hanging knee and strap combined under every beam on both decks. Extending well down the bilge, this arrangement not only adds great strength but is a vast economy of room over the old wooden knee. The steam steering gear, pumps, windlass, etc., are in a forward house of large dimensions. The Thomas is owned principally by George C. Thomas of Philadelphia and her builder, Capt. Chas. B. Dix of New York. She will hail from New York. Her cost will foot up not far from $70,000. Her fine cabin finish comes from Morse & Co., Bangor; her wheel, blocks, etc., from Knowlton of Camden. Her anchors are of Camden forging, and machinery from the Bath Iron Works of Bath. The Thomas will be commanded by the well known shipmaster, Capt. Alberto L. Kent of Brewer, late of the schooners Edward Stewart and Thallium, the first craft launched at Bucksport by McKay & Dix. She will load box shooks for the Mediterranean. Work will be resumed at the yard about March 20, when a keel about 206 ft. long will be laid for a four-master, the largest that has been built so far, also a 160-ft. keel for a four-master which will measure some 800 tons. The frames are being got out this winter in Nova Scotia.

Messrs. C. & R. Poillon, at their yard at the foot of Clinton street, New York, have partly framed out a fine modelled auxiliary schooner yacht, designed by Messrs. A. Cary Smith & Barbey for Mr. Wm. H. Alley of Chicago. Her dimensions are: Length over all, 96 ft.; length on water line, 68 ft.; breadth of beam, 20 ft. 4 in.; draught, 10 ft. 6 in. Her frame is of oak and the planking of yellow pine. The deck will be of white pine. All the timber employed in her construction is of long length and selected. Her masts will be of Oregon pine. She has a lead keel of 32 tons. She will be ready by May 1. This yacht is a fine example of the expert work in ship building for which the firm of C. & R. Poillon are noted.

A contract was awarded recently by the Philadelphia & Reading Railway Co. to the Neafie & Levy Ship & Engine Building Co. of Philadelphia for the construction of a steel sea-going tug, to be named the Carlisle. She will be similar to the Lykens, delivered a year ago, 170 ft. in length, 29 ft. beam and 15 ft. draught, loaded. The Carlisle is intended for service on the Philadelphia & Reading Transportation line, operating between Port Richmond and New England ports.

It is said that the Staples Coal Co. of Taunton, Mass., has about decided to build another river and harbor tug. It will replace the J. P. White, but the latter's machinery, which is in excellent shape, will be used in the new tug. The White's engines are very powerful, too much so for the old hull they drive. The lines of the new boat have not been drawn, as the exact size has not yet been decided upon.

At the Kelley-Spear Co. yard at Bath, five sea-going wooden vessels are in course of construction, three 3,000-ton barges for the Staples Coal Co., a four-masted schooner for Chas. Hirsch of New York and a 900-ton spruce barge. The Staples Coal Co. barges will be named Havana, Matanzas and Cardenas and the smaller barge Sagua.

L. M. Hatch & Sons have contracted to do the inboard and outboard work on the new schooner now building at W. S. Currier & Co.'s yards at Newburyport, Mass. The work of the Messrs. Hatch on the Edith H. Symington was so satisfactory to all concerned that they had no difficulty in securing the new contract.

Wilson Bros., mill men, Aberdeen, Wash., have closed a deal with the Lindstrom Brothers to build them a steamer 180 ft. long at a cost of $70,000. The contract calls for the completion by July 1 next. She will have a capacity of 700,000 ft. and will be put into commission here.

A contract has been awarded to Robert Palmer, Noank, Conn., for ten sea-going steel barges. Their dimensions are 200 ft. length, 35 ft. beam and 1,600 tons capacity. There are two contracts aggregating over $300,000.

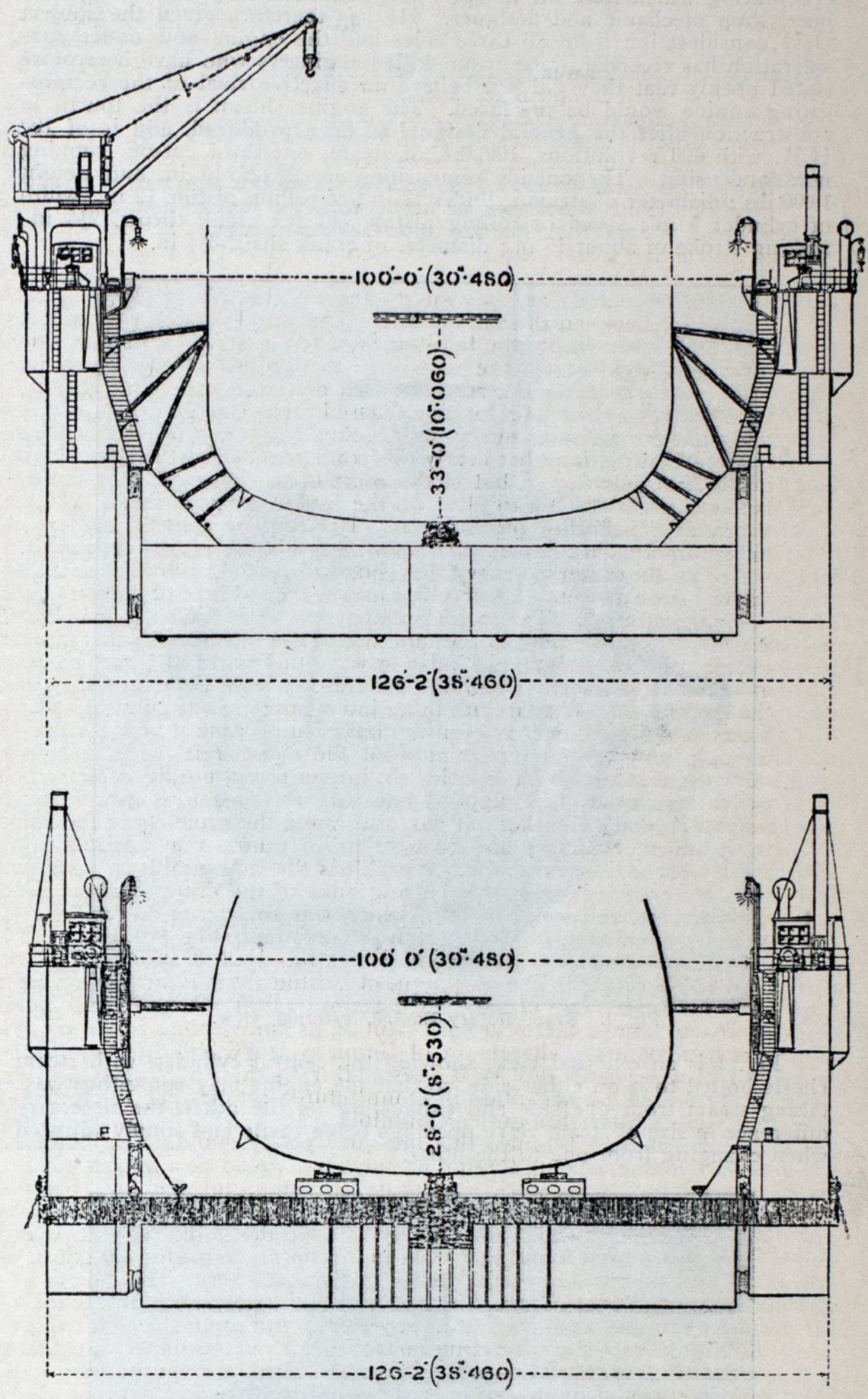
The torpedo boat Macdonough, launched from the yards of the Fore River Engine Co. last week, is the last vessel to be launched at the East Braintree plant. Ship building operations in the future will be at Quincy point.

CLEVELAND BREAKWATER.

Senator Hanna has been represented as being opposed to the extension of the breakwater at Cleveland as far as Gordon park by government appropriation. Discussing the subject he said: "I am not particularly opposed to the extension of the arm of the breakwater, but it does appear to me as none of the functions of government to do more than create a harbor of refuge for lake shipping making the port of Cleveland. It is a question whether extension as far east as is contemplated—Gordon park, isn't it?—would be exceeding the government design. True, it would permit vessels loaded with freight for the factories along the lake shore to unload at piers constructed within its protecting arm, and that would effect a saving in the freight haul from the river and present docks. Then again comes the question as to whether the government is going into the business of saving freight for individual owners of plants?"

TWO IMMENSE FLOATING DOCKS.

Mr. Joseph Beale of Washington, D. C., agent in the United States for Clark & Standfield, dock engineers of London, England, favors the Review with particulars of a floating dock for Bermuda, for which the British admiralty a short time ago accepted the tender of Messrs. Swan & Hunter of Wallsend-on-Tyne. Mr. Beale also sends data comparing the Bermuda dock with the dock which is being built at Sparrow's Point, Md., for the United States government, and which is to be located at Algiers, La. Messrs. Clark & Standfield are the designers of both docks. The Bermuda dock is to be finished in twelve months, tested and then



PLANS OF BERMUDA AND ALGIERS FLOATING DOCKS.

towed to her destination. These two docks are similar in most respects, the main difference being in the manner of shoring the ships on the dock. The American plan is to depend upon keel blocks in conjunction with docking keels; the English plan is to support the armor belt on a large number of more or less vertical shores inserted under an angle iron firmly attached to the belt. Sections of the Algiers and Bermuda docks, shown herewith, illustrate this point. The following data is given by way of comparison:

	BERMUDA DOCK.	ALGIERS DOCK.
Type	Self docking.	Self docking.
Material	Steel.	Steel.
Length over keel blocks	545 ft.	525 ft.
Width of entrance	100 ft.	100 ft.
Depth on sills	33 ft.	28 ft.
Height of keel blocks	4 ft.	4 ft.
Depth of pontoon	15¾ ft.	17½ ft.
Weight of hull	6,500 tons	5,850 tons
Maximum power	17,500 tons	20,000 tons
Cost	$900,000	$810,000

The Monongahela River Consolidated Coal & Coke Co., Pittsburg, will build a powerful steel hull towboat, larger and stronger than any other towboat running on the rivers in the vicinity of Pittsburg. The boat will be about 275 ft. long, 53 ft. wide and 7 or 8 ft. deep in the hold. The machinery will be compound with 60-in. cylinders and a 12-ft. stroke. The boat will be furnished with a battery of ten boilers, the engine driving a wheel 10 ft. in diameter. It is expected such a steamer will be able to tow 1,500,000 bushels of coal in a single tow. The steamer will cost about $150,000.

EVANS MULTIPHASE ROTARY ENGINE.

A RIVAL OF THE RECIPROCATING ENGINE THAT IS TO BE BACKED BY A STRONG CORPORATION OF LARGE CAPITAL—DETAILS OF CONSTRUCTION.

The accompanying illustrations show the general appearance and details of construction of an engine patented August 25, 1900, by James M. Evans, 805, No. 84 La Salle street, Chicago. It is the final outcome of nearly eighteen years of thought on the subject of rotary engines in general, during which time the inventor has ben alternately stationary engineer, shop mechanic and designer. He has therefore given the subject close consideration from all three sides and the engine now under consideration has received praise from skilled engineers who have heretofore stated openly that they did not believe an effective rival of the reciprocating engine would be produced. The engine shown is the fourth in construction after the general design had been produced, and is of 100 H.P., with 600 revolutions, 100 lbs. of steam, one-third cut-off, running non-condensing. The outside dimensions are 22x22x16 in. and weight 1,000 lbs.; diameter of steam cylinder 17 in.; of rolling piston, 12 in.; width of cylinder 5 in.; speed of rolling piston, 567 ft.; crank throw, 2½ in., making stroke of about 16 in.; diameter of crank shaft, 3½ in.

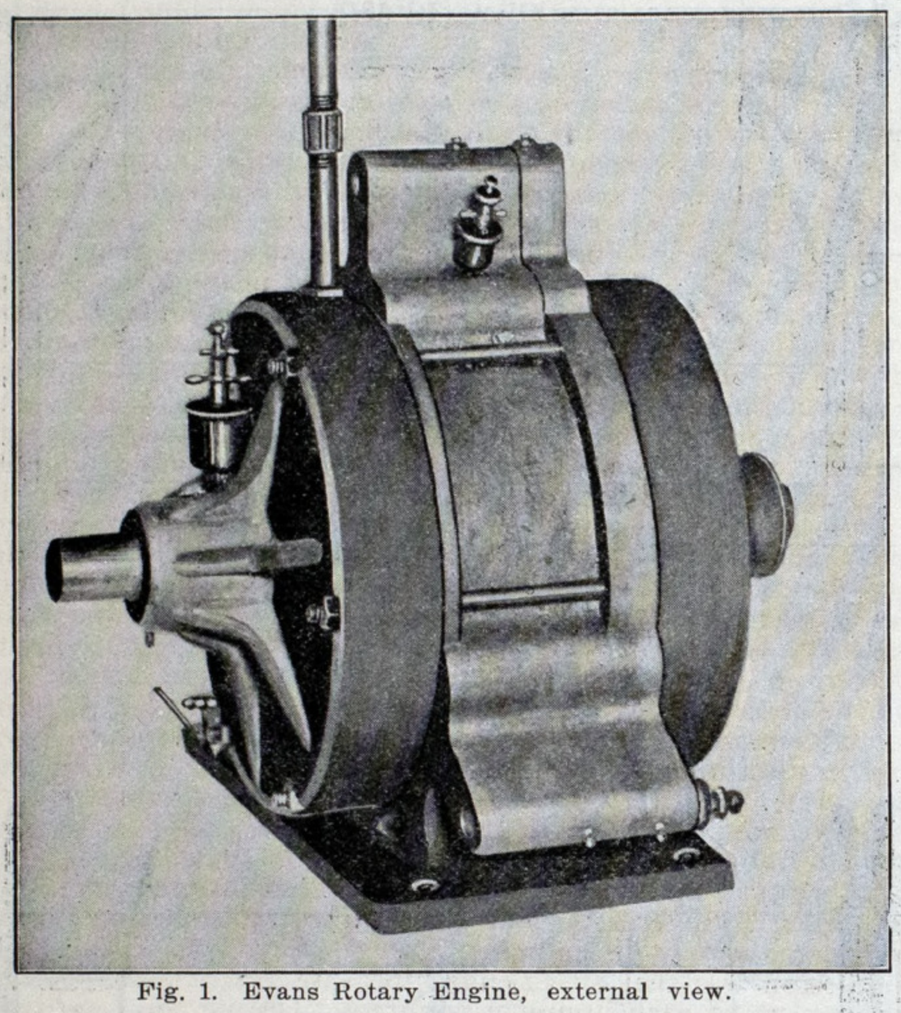


Fig. 1. Evans Rotary Engine, external view.

Fig. 1 is an external view, showing the central cylinder, with steam chests bolted to it on either side, so that the engine may run either way, taking steam from one side and exhausting on the other, the necessary difference in size of steam valve openings being easily and simply adjusted when changing from one to the other.

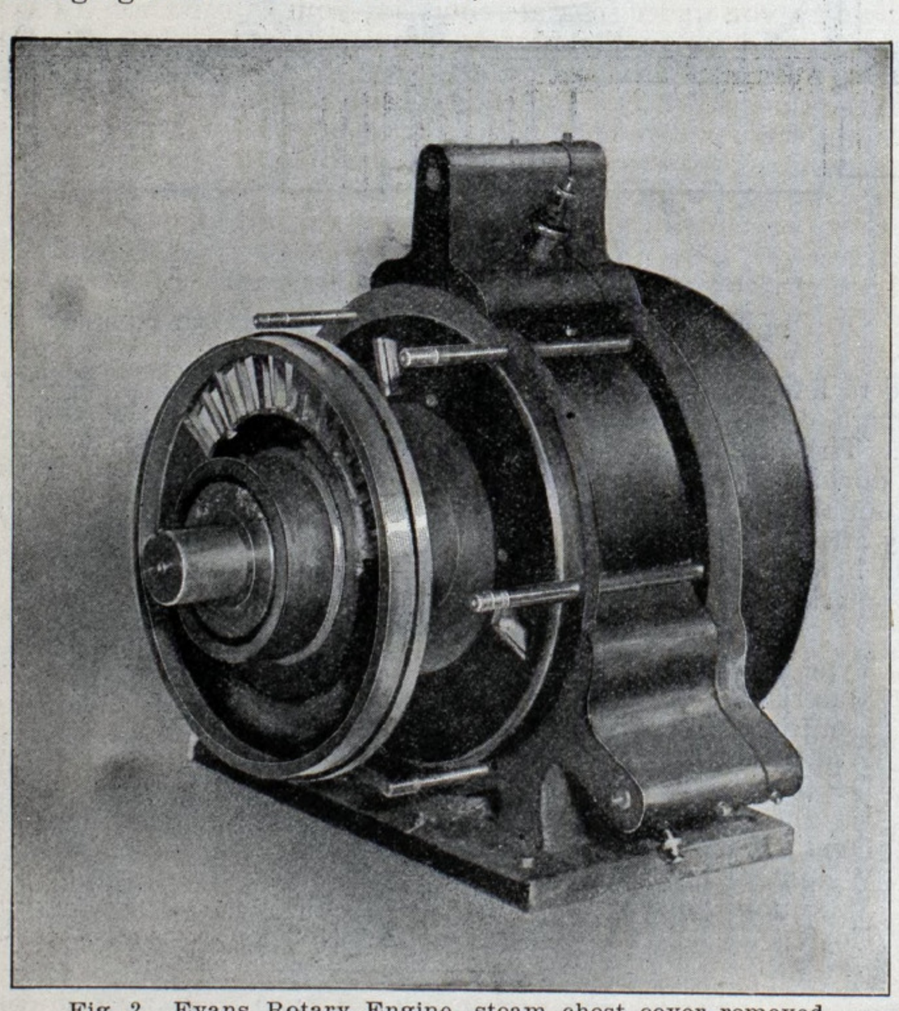


Fig. 2. Evans Rotary Engine, steam chest cover removed, showing steam valve and ports.

Fig. 2 shows the cover of the steam chest removed and the steam valve pulled out on the shaft, revealing two of the three steam ports, in the head, a central hub containing roller bearings for the main shaft, and the central cup-shaped part of the steam valve necessary to fit over this hub. The valve consists of two parts, the disc as shown and a sliding annular ring, containing the same number of openings as the disc upon which it is carried, and adapted to be automatically rotated by a governor, or to remain constantly at a predetermined angle of cut-off as desired. In the latter case the cut-off may be varied while the engine is in motion, ranging from the full opening of 120°, as shown, to a point where all but two of the openings are closed.

Fig. 3 shows the valve and cylinder head removed, revealing the working parts within the cylinder. These consist of the crank shaft A, which is built-up, to allow of easily removing the working parts; the rolling piston B, journaled upon the crank pin and revolving upon the pin.

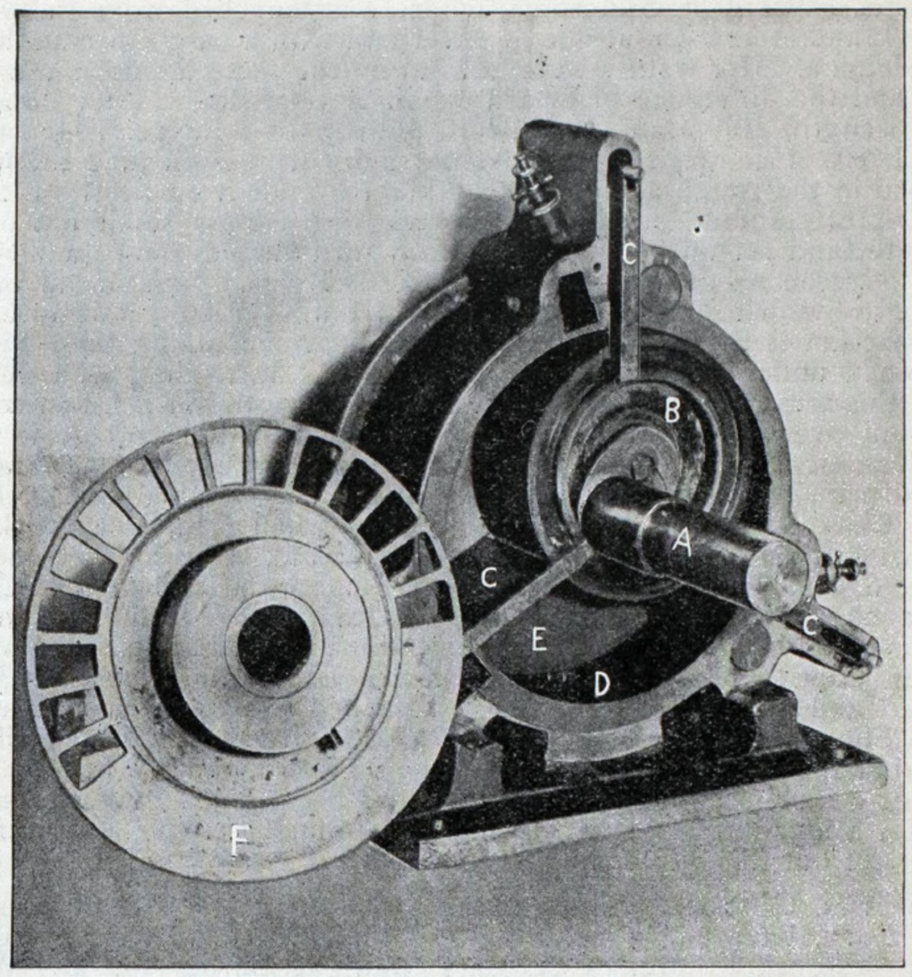


Fig. 3. Evans Rotary Engine, interior of steam cylinders.

with the outer circumference rolling in contact with the wall of the cylinder. Three division walls C, separate the cylinder into three 120° compartments, each of which has separate steam entry and exhaust ports. In the view the exhaust port shows an angular opening and the plug on the right side of the upper pocket shows the position of the steam entry port. These ports are similar, each being plugged on alternate sides. The division walls are held in position by shoes in grooves of the sides of the rolling piston and move in and out of the pockets in the cylinder as the piston rolls about the cylinder. They are supported on both sides for their whole length by grooves in the cylinder heads and also by the whole width of the pockets, one-third of the length of the slides always remaining within the pockets. A rocking shoe, Fig. 4, is provided at the inner end of each slide. which maintains a steam-tight joint between the circumference of the rolling piston and the inner end of its division wall. A balance plate of ordinary construction is used on the steam side of the division walls, to maintain tight pockets for the slides. The outer ends of pockets are cored to form pneumatic chambers to receive and return the divisions, the pressure of air being calculated to receive and overcome the momentum of the slides and return them without undue force.

The piston is a disc of cast iron, bored to receive the crank pin and covered by two thin annular shells, serrated in the center of their circumference so as to move out against the cylinder heads without allowing steam to leak under the ends of the division walls or slides. They are turned down over the sides of the piston, so as to carry the grooves for the shoes of the slides, and are fastened to the piston by flat annular rings of copper, the outer circumference of the rings being anchored to the inside of the movable shells and the inner circumference clamped to the piston by clamping rings and screws. This gives a steam-tight joint of great flexibility and allows the sides of the shells to be held against the cylinder heads by the steam pressure in the chamber. As the steam and friction surfaces may be readily proportioned to each other on the principle of a balanced valve, it will be seen that the packings on all points of wear are steam-controlled and that they will remain tight to the limits of wear; also that these limits may be much greater than in the ordinary engine. The motion of the rolling piston is epicycloidal in all its parts, so that there is no wear on the cylinder wall, very little on the crank pin, which is fitted either plain or with roller bearings, and the motion of the shells rubbing on the cylinder heads will keep both shells and heads flat to the limits of wear. The packing on the ends of the slides rubs against the circumference of the piston shells, but owing to the shape of the shoe. Fig. 4, it is steam controlled, and the great latitude of motion in the pocket will keep it tight until worn to the point where renewal is necessary. New packings are cheap and easily inserted. All curves are circular and all planes flat and right-angled, making them easy of renewal with limited facilities, as would be the case on ship board, or in small ports with poor machine shops.

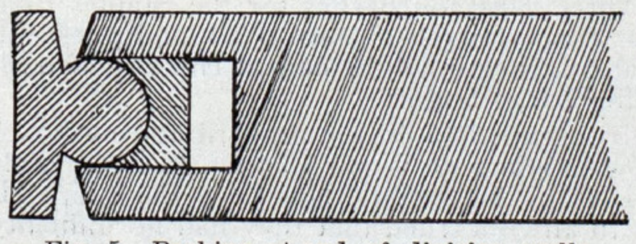


Fig. 5. Packing at end of division walls.

The piston speed is slow—much slower than is the case in many reciprocating engines—and slower than most experts would believe until they had calculated the epicycloid curves with due reference to the diameters of cylinder and piston in relation to the crank-throw. By placing an actual crank in the engine, the side pressure of the steam is taken off the shaft and utilized in holding the piston against the cylinder wall, while any wear on the crank pin will not affect the working parts of the engine, as the piston is entirely controlled by the steam and the cylinder wall. The wear on the crank-shaft boxes is, therefore, less than in the recipro-

cating type of engine, as the shaft is not subject to the side thrust of the ordinary engine at the ends of the stroke. With one chamber exhausting, one with steam expanding and one taking steam at boiler pressure, or with two expanding, or in any other position, the resultant of the forces maintains the thrust always at right angles to the throw of the crank. The

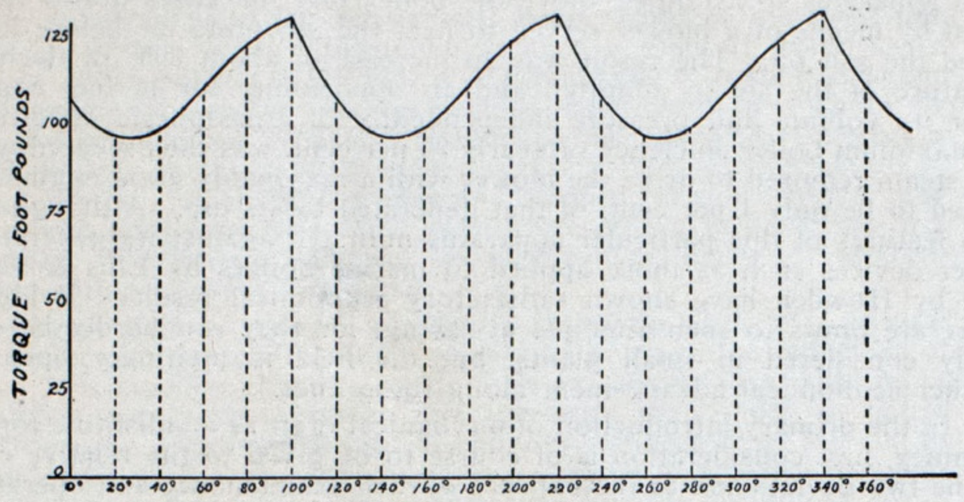


Fig. 6. Evans Rotary Engine.

steam valve contains large, flat surfaces and the valve seat and all moving parts of the steam cylinder are oiled by the oil carried in by the steam.

In starting, the engine takes steam at boiler pressure in two of the compartments at once, but as it gathers speed the cut-off reduces the angular opening of the steam admission valve until the cut-off attained is sufficient to carry the load at a given speed, after which the steam is used expansively, the reduced valve opening admitting steam to the various chambers in rotation. The shape of the chambers is such as to obtain the full pressure upon the surface of the piston with a very thin layer of steam, and there being no clearance, the economy in this direction is marked. The condensation is also very small, as the steam is filling the live and exhaust sides of the cylinder heads, and the periphery is of such shape as to be easily jacketed. Compounding is simple and is accomplished by placing the additional cylinders side by side with the high pressure, with steam chests between them.

The simple engine, as shown, can be used condensing, and when so used the entire surface of the rolling piston exerts power to operate the crank shaft. The surface upon which steam pressure is exerted is equal to a plane whose length is the sum of the chords of the arcs of steam area, multiplied by the width of the cylinder, which gives a very large pressure

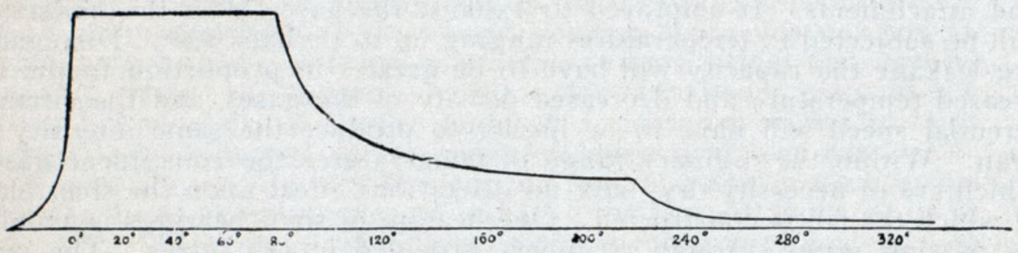


Fig. 7. Evans Rotary Engine.

surface to be acted on by a very thin layer of steam. An actual measurement of the piston chords showed 11.25, plus 7.5, multiplied by 5 in. for the steam side, and 3, plus 10.75, multiplied by 5 in. for the exhaust side of the piston, or 93.75 in. steam pressure and 68.75 in. on the exhaust side of the piston. The lengths of these chords vary, as the contact point of the piston and cylinder is constantly changing, but the above will indicate that the surface of mean effective pressure is much larger than is usually the case with rotary engines. The steam exerts a very gradual increase of pressure upon the piston, as the steam entry ports are close to the division walls, and as the point of contact rolls past the port the surface exposed to boiler pressure increases steadily until the point of cut-off is reached, when the pressure gradually decreases until the exhaust ports open, obviating the heavy blows caused by the steam striking the full surface of the piston of the ordinary reciprocating engine. The epicycloid motion of the piston allows the chamber to enlarge considerably after the angle of one-third revolution has been passed, hence steam may be admitted at boiler pressure for one-third of a revolution and then be used expansively for another third of its revolution. This is true of each

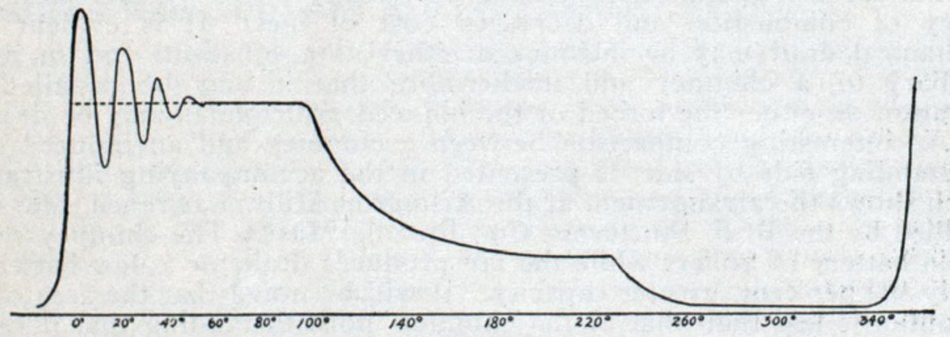


Fig. 8. Evans Rotary Engine.

of the three compartments in each revolution, so that we have a similarity to the triple cylinder engine, one compartment constantly taking steam at boiler pressure, one using it expansively and the third exhausting. Hence as the area exposed to boiler pressure increases in one chamber, the preceding one decreases its pressure by expansion, thus maintaining a nearly constant pressure on the crank shaft.

The engine will start with full boiler pressure on two chambers and cut off as speed is attained; this gives by actual test, when starting, a pull of about four times the power used when running regularly. This is a particularly valuable feature of reversing engines.

The exhaust valve, shown leaning against the engine in Fig. 3, shows that ample time is given to allow of the escape of steam and thus all liability of back pressure is avoided, as the steam has twice as long a time in which to escape as in the ordinary engine.

The engine will run from twenty to 800 revolutions per minute and is noiseless and without vibration. It will start at five lbs. steam pressure and attain 460 revolutions per minute, running without load, and the indicator cards show no drop in the steam line at that speed and pressure. It was run noncondensing at 600 revolutions per minute, one-third cut-off, 100 lbs. steam pressure, with a steam consumption of 21.17 lbs. per horse power per hour; with one-fourth cut-off and other conditions unchanged the consumption was 18.01 lbs. per horse power per hour. The load was sixteen 500 candle power arc lights, operated by a dynamo connected to the engine by a short 14-in. belt. The friction on full load was about 8 per cent.; with no load, 1½ per cent., showing a friction varying with the load. This varying friction is due greatly to the use of roller bearings.

The Evans Multiphase Engine Co. is organized with a capital of $5,000,000, and is getting ready to supply a full line of sizes of these engines for various purposes. They will be made simple, compound and triple expansion, and from 100 to 1,000 revolutions per minute. It is the intention of the company to manufacture and market the engines themselves, but other manufacturers will be allowed to build them upon royalty.

URGENT CALL TO MANUFACTURERS.

PRESIDENT OF THE NATIONAL ASSOCIATION SAYS THAT ITS POWER AND INFLUENCE SHOULD BE EXERTED IN FAVOR OF THE SHIPPING BILL—STRONG LETTER FROM THEODORE C. SEARCH.

The following letter in reference to the pending shipping bill is being sent out to the members of the National Association of Manufacturers by President Theodore C. Search of Philadelphia:

"From its organization our association has advocated the restoration of a merchant marine and the American flag to the high seas. Each successive annual convention has renewed its support of this idea. Considering the expressions of these conventions to be practically imperative instructions, your president and executive committee have given much careful thought as to the methods whereby the results should be accomplished. Your president, as explained at our last annual meeting, has co-operated as an active member with a carefully selected committee of American citizens who, by practically continuous work and consultation covering a period of two years, analyzed the subject thoroughly and considered carefully every method which was presented from any source looking to this end. Without undertaking to follow their detailed work, it is sufficient to say that numerous expedients, embracing discriminating bounties, free ships, the reform of navigation laws, etc., were fully considered. Having in view the object to be attained, and bearing in mind that government aid and support were considered absolute necessities to accomplish the end, the committee unanimously approved and presented to the fifty-fifth congress a measure which became widely known as the Hanna-Payne bill. This measure, or proposition, was taken in hand by the committee on commerce in the senate and the committee on merchant marine and fisheries in the house of representatives, each of these committees being composed of able men from all political parties. These committees gave careful consideration to the bill and held almost continuous hearings, at which parties representing every diversity of sentiment were admitted to testify. Information was sought from every branch of commercial trade and industry and the experience of all nations in governmental intervention in maritime matters was carefully collated and considered. The measure was subjected to the criticisms of the press and information touching its provisions was widely disseminated among the people. The outcome of this discussion was that an amended measure was finally reported by a majority report to each house of congress. During the time that these measures have been before congress a number of amendments, based upon an apparent expression of public opinion, have been engrafted thereon. The bill as amended is now being discussed in the senate and the remarks in explanation thereof made by Senators Frye and Hanna, who are prominent members of the committee which prepared it, have been printed, and I am sending you under separate cover for your information a copy of the bill as amended up to the present time; the remarks of Senator Frye, acting president of the senate and chairman of the committee on commerce; the remarks of Senator Hanna, who is also a member of the committee on commerce, who has given the matter most careful attention. I ask your candid perusal of these documents, after which I ask, if you can see your way conscientiously to do so, that you take the question up with your senators and representatives, urging their support of the measure.

"It occurs to me to suggest that the object to which our association has given such repeated support can most practically and most probably be accomplished by the passage of the present measure, with such further amendments as congress in its wisdom may see fit to draft. I am deeply impressed with the conviction that failure to enact this measure into a law by the fifty-sixth congress will be a practical abandonment of governmental effort to restore our merchant marine. The attacks upon this measure, which seem to derive their main support from persons interested in the operation of ships under foreign flags, are in the main uncandid, misleading and in many instances absolutely unfounded upon demonstrated facts. Specious suggestions of other plans are unaccompanied by any demonstration of their feasibility or practical application to existing commercial conditions and the relations of our government with other nations. They are largely based upon doctrines practically adverse to the principles upon which the commercial prosperity of our country has been developed. The proposition to buy ships in the cheapest market would be a death blow to our ship building industries. To undertake by discriminating duties to build up American export trade would be equally futile, as these bounties would only apply to imports. A bounty upon exports is now admitted by its former most earnest advocates to be a delusion and a snare which would simply result in adding profits to middlemen, to foreign carriers, or to foreign consumers, without possible benefit to the manufacturer or the farmer. Hence, believing that the measure in question represents the best results of careful labor by conscientious and careful men, both in and out of congress, I feel firmly convinced that whatever power and influence our association may have in shaping the legislation of this country should now be brought into requisition. Acting under the practical instructions and support of the association, your president has maintained, in connection with the department of legal investigation, an agency in Washington whereby all measures in which your association is interested are carefully followed, with a view of keeping the interests of manufacturers well to the front. The reports of this agency indicate a necessity for this communication."

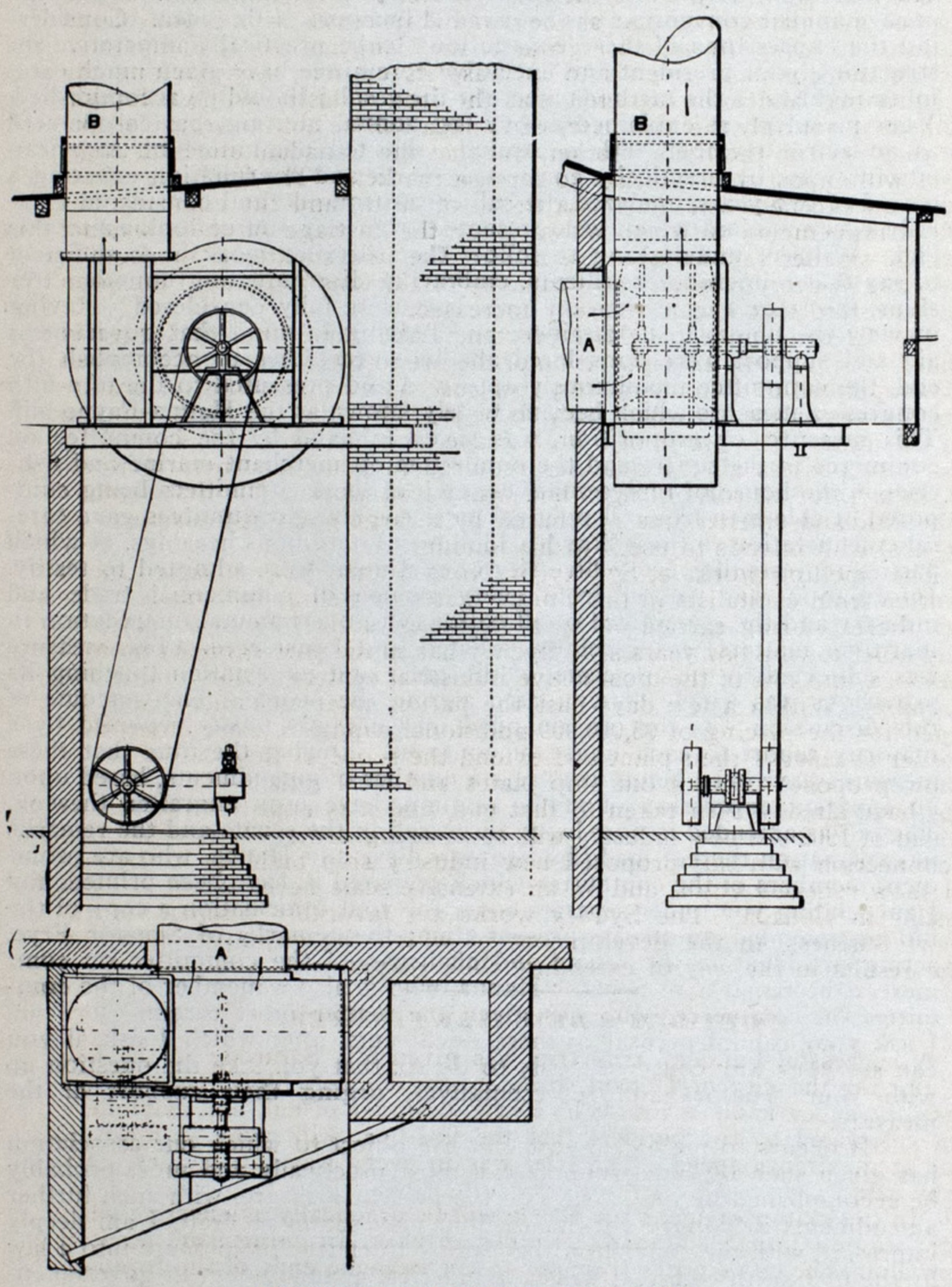
MECHANICAL DRAFT.

ITS APPLICATION TO STATIONARY BOILERS—A SUMMARY OF ITS ADVANTAGES AS AGAINST THE CHIMNEY.

Abstract of lecture by Walter B. Snow, Boston.

In any consideration of mechanical draft, comparison must naturally be made between the chimney and the fan blower as a means of draft production. Inasmuch as the steam jet usually requires for its operation from five to ten times as much steam as does the fan, this method of producing draft does not properly enter the discussion. The chimney, because of its method of operation, is of necessity an exceedingly inefficient device for moving air, for a relatively high temperature of the flue gases is absolutely essential to its action. As a result, from 20 to 40 per cent. of the heat of the fuel is dissipated in the atmosphere without further useful effect. This is by far the greatest waste occurring in modern boiler practice. Any attempt to utilize a portion of this waste heat necessarily reduces the temperature and lessens the draft, which, in the case of a chimney, can only be made good by increasing its height. A chimney 100 ft. high with external air at 60° and internal gases at 500° will produce an unbalanced pressure of about 0.65 in. If the temperature of the gases be lowered to 300° a chimney about 150 ft. in height will be required to produce the same intensity, while for a temperature as low as 200° the chimney will have to be about 240 ft. high.

With the low chimney effective utilization of the heat of the waste gases is therefore impossible, for in order to maintain the draft they must



ARLINGTON MILLS, LAWRENCE, MASS.

of necessity pass away at relatively high temperature. A high chimney on the other hand entails considerable expense and even then continues to wastefully employ the heat. As compared with this wasteful process of air movement a fan calls for an expenditure of only about 1-75 of the heat required by the ordinary chimney to produce the same results. Or in other words, practically all of the heat of the waste gases is rendered available for utilization and it only remains to provide the necessary means for abstracting the heat. For effective working the initial temperature of these gases must be approximately 75° above the temperature of the steam within the boiler. Between this point and the atmospheric temperature is marked the range through which the heat abstractor may be effective. The fuel economizer is now well established as an effective means of transferring the heat from the gases to the water fed to the boiler. It naturally shows the highest efficiency when the initial temperature of the gases is excessive, that of the water entering the economizer is low and the fuel is high priced. The temperature of the gases necessary to produce the requisite draft with a chimney, evidently marks the limit to which they may be cooled by the economizer. With a fan, however, the intensity of the draft is practically independent of the temperature of the gases, and in point of fact when a fan is applied upon the induced principle, a decrease in the temperature actually increases the intensity of the draft produced at a given speed. It is here therefore that the fan shows its fundamental advantage over the chimney, in that it renders available for utilization practically all of the waste heat. Reports of tests made by Mr. William R. Roney in plants equipped with fuel economizers and mechanical draft apparatus in place of a chimney show an average saving of about 15 per cent. resulting from the introduction of this combination.

Another means of utilizing the heat of the flue gases is by air heaters or heat abstractors. In 1881-82 Mr. John C. Hoadley carried on at the Pacific mills, Lawrence, Mass., an exhaustive series of tests of the Marland apparatus so arranged above the boiler that the gases drawn therefrom by means of a blower served to heat the incoming air before it entered the ash pit. The result was an increase of about 300° in the temperature of the air so admitted and an opportunity for perfect control over its volume and pressure independently of atmospheric conditions. A maximum boiler efficiency of nearly 90 per cent. was thus secured while the steam required to drive the blower with a reasonably good engine was stated to be only 1 per cent. of that generated by its use. Although certain features of this particular apparatus militated against its general use other devices such as those applied to marine boilers by Ellis & Eaves and by Howden have shown satisfactory economical results. Evidently there are limits to such attempts at saving, for they can hardly be seriously considered in small plants, but the field is invitingly open for further economical advancement along these lines.

In the primary introduction of mechanical draft as a substitute for the chimney, first consideration is of course to be given to the relative costs of the two devices and to the expense of their maintenance and operation. From comparison of a considerable number of plants differing widely in character and capacity it appears that under ordinary conditions a single forced draft fan with direct connected engine and short stack can be installed for less than 20 per cent. of the cost of a brick chimney; a single induced draft fan with direct connected engine and short stack will cost less than 30 per cent. of a chimney; and that a duplex induced draft apparatus consisting of two fans with direct connected engines, inlet and outlet connections and short stack will cost but little more than 40 per cent. of a chimney. The latter arrangement is only employed where, as in the case of an electric lighting plant, it is the practice to introduce relay units. Of course the height of the delivery stack must depend upon the elevation of the surrounding buildings. Where tall buildings are not adjacent and the boiler house is of moderate height, the smoke pipe need pass only just above the roof. This is in fact the customary practice. But where the smoke must be discharged near to other buildings it is obvious that the delivery pipe must be carried above their roof line. Owing, however, to the positive action of such a fan, the area of the stack may be materially less than would be required with natural draft.

The cost for maintaining a mechanical draft apparatus depends to a certain extent upon the method of application. If applied to force air to the ash pits it will operate at moderate speed, will handle only cool air and will certainly have as long a life of service as the usual boiler fixtures and attachments. If employed to exhaust the gases from the boilers, it will be subjected to temperatures ranging up to perhaps 600°. Disregarding leakage the capacity will have to be greater in proportion to the increased temperature and decreased density of the gases, and the circumferential speed will have to be higher to produce the same intensity of draft. Within the ordinary range of temperatures the constituent gases, which are of necessity dry, have no deleterious effect upon the steel plate of which the fan is constructed. Overheating of shaft bearings is avoided by passing water through chambers provided in the boxes. The conditions, so far as they affect the life of the fan, are therefore practically no more adverse than in the case of a forced draft installation. As evidencing the durability of a fan operated under these conditions it may be stated that in 1892 Cheney Bros. of South Manchester, Conn., installed in connection with a plant of 1,000 H.P., an induced draft fan for taking care of additional boilers and economizers, the chimney being of insufficient capacity to do the work. A recent report indicates that this fan shows no effects of wear and that there is no evidence but that it will last for a long time.

The expense of operation depends of course upon the disposition of the exhaust from the fan engine. If this is utilized as it should be in any well planned plant the cost of draft production becomes almost infinitesimal. If, however, the exhaust must be discharged to the atmosphere the actual expense for operation, as measured by the proportion of steam so used, compared with that generated, ranges from ½ to 2 per cent. in plants of reasonable size up to perhaps 3 or 4 per cent. in small plants. It may be readily shown that with the smaller amount the annual fuel expense for operating the fan will be materially less than the fixed charges on the additional cost of a brick chimney to produce the same results. Any great expenditure for operation is almost universally offset by increased efficiency of combustion and decreased cost of fuel. It is evident that mechanical draft may be introduced either as a substitute for, or as an auxiliary to, a chimney and furthermore that it may be installed for operation on either the forced or the induced principle as may be desired.

An interesting comparison between a chimney and an induced draft fan standing side by side, is presented in the accompanying illustration, which shows the arrangement at the Arlington Mills, Lawrence, Mass., as installed by the B. F. Sturtevant Co., Boston, Mass. The chimney serves an old battery of boilers while the fan produces draft for a new battery of nearly 100 per cent. greater capacity. It will be noted that the area of the fan outlet is less than that of the chimney, notwithstanding that it serves nearly double the boiler horse power. The fan wheel is overhung within the casing, the shaft being supported by external bearings. The gases passing through the inlet A are discharged through the pipe B which extends only a short distance above the roof. The fan is driven by belt from a horizontal engine which is placed below. Otherwise than this no valuable floor space is occupied.

All types of engine-driven fans can be readily controlled by the steam pressure through the medium of a special regulating valve, or a combination of damper regulator and lever valve. A very slight rise or fall in the steam pressure actuates the valve and greatly decreases or increases the amount of steam admitted to the engine. The steam pressure can thus be automatically maintained within a pound above or below the normal while the fan instantly responds to changes in conditions and particularly to sudden demands for more steam. This feature of flexibility and of ready response is almost invaluable in plants where there are great fluctuations in the steam requirements, such for instance as in dye houses and bleacheries. Higher fan speed not only increases the air volume but coincidently increases the intensity of the draft, which of course facilitates the ready passage of larger volumes at higher velocity. Surplus capacity

can be more readily and economically provided in the fan than in the boiler. That is to say, within limits it costs far less to install a fan of sufficient capacity to force 1,000 H.P. of boilers to an output of 2,000 H.P. to meet sudden or temporary demands than it does to provide a like surplus in boiler capacity. The fan thus finds special opportunities for service in connection with mills which are usually operated by water power, but which of necessity must install steam plants to meet possible contingencies of low water. Inasmuch as such a plant is likely to be operated for only a portion of the year it is warrantable to force it and thus operate it under somewhat less economical conditions than could be obtained if a much more expensive equipment was installed to secure a higher efficiency. In the case of sudden accident like the destruction of a chimney, the fan, which can be built and shipped on short notice, may perform even a temporary service of great value during the erection of a new chimney. Experience with the fan is, however, likely to result in doing away with a chimney altogether.

The largest item of operating expense being the fuel, it is natural that in a boiler plant special attention should be given to the reduction of this item. It is manifest that low grade fuels are almost invariably more finely divided and require greater draft pressure than those of better quality. With the customary height of chimney, ranging from say 100 to 150 ft., and particularly with economizers it is difficult to produce sufficient intensity of draft to burn fuel of this character. For the burning of No. 2 or 3 buckwheat coal at a very moderate rate of combustion, that is less than 15 lbs. per square foot of grate, a draft of 5/8 in. to more than 1 in. of water is required. The theoretical height of a chimney to produce the latter intensity with external air at 60° and gases leaving an economizer at say 350° is very nearly 200 ft. The fan, introduced either for forced or induced draft, readily creates this intensity while operating at moderate speed. This speed may be automatically regulated to the exact requirements of the fuel. Inasmuch as the average height of chimney practically determines the relation between the rate of combustion and the quality of the fuel which may be burned, it indirectly establishes the proportions of the boiler. An increased rate of combustion necessitates a deeper fire and more intense draft, which the chimney may be unable to produce, but which may be readily created by means of a fan. Each particle of air in passing upward through the deeper bed of fuel, under this more intense draft, thus has better opportunity for parting with its oxygen, and therefore produces more effective combustion. Principally for this reason plants operated by mechanical draft have been forced far beyond the boiler rating without showing material loss of efficiency.

As this system of draft production becomes more generally introduced we may therefore look to certain changes in boiler design which will more effectively meet the conditions of high furnace temperatures with decreased air supply. The economy in fuel resulting from the introduction of mechanical draft is of necessity relative, for it depends largely upon the quality of fuel which it was possible to burn before this method was installed. Thus, for instance, in the 1,000 H.P. boiler plant of the United States Cotton Co. at Central Falls, R. I., it was necessary to burn Cumberland coal costing $4 per ton when chimney draft was used. The introduction of a forced draft system costing less than $600 made possible the reduction in quality and price of fuel to a mixture of about 70 to 75 per cent. of No. 2 buckwheat, 20 to 25 per cent. of yard screenings and 5 to 10 per cent. of Cumberland, costing $2.62 per ton. The result in annual saving was about $6,500. Of course such comparisons are largely affected by geographical location and the possibility of securing low grade fuel. But it is evident that mechanical draft may be employed to burn almost any grade that it is practicable to employ.

Mechanical draft has thus been shown to cost far less for installation than the chimney, to be essential to the most complete utilization of the waste heat of the flue gases, to be capable of burning low grade fuels and decreasing the fuel cost, be able to readily meet sudden and excessive demands for more steam, to be flexible in its character, entirely independent of atmospheric changes, and capable of adaptation to almost all conditions whether as a substitute for, or an auxiliary to a chimney. It is manifest that it may be installed either on the forced or induced principle as required, and that it may be automatically controlled so as to maintain constant steam pressure. The recent remarkable increase in the adoption of this method of draft production is far better evidence than any personal prophecy of the fact that mechanical draft will occupy a most important position in the boiler plant of the future.

MORAN BROS. CO. GET A BATTLESHIP CONTRACT.

In accordance with a suggestion of the secretary of the navy, the naval board of construction has determined that under the law providing for the construction of three sheathed battleships one of the vessels must be built on the Pacific coast. The contract will go to the Moran Bros. Co., Seattle, Wash., the lowest Pacific coast builder. Negotiations will be entered into with the Bath Iron Works, Bath, Me., and the Newport News Ship Building and Dry Dock Co. which will receive contracts for building the two sheathed battleships to go to the Atlantic coast ship yards if they agree to do the equipment work omitted from their bids and to scale their prices.

The department has definitely decided to award the contract for the two unsheathed battleships to the Fore River Engine Co. of Quincy, Mass., but the award will not be made until the company carries out an intention to reincorporate. Should the negotiations concerning the three sheathed battleships be successful, the construction of the eleven armorclads for which bids were opened recently will be distributed as follows: One sheathed armored cruiser and one unsheathed armored cruiser each, by the Cramps, the Newport News Co. and the Union Iron Works of San Francisco, six vessels in all; two unsheathed battleships to the Fore River Co; one sheathed battleship each to the Newport News Co., the Bath Iron Works and Moran Brothers, three vessels in all. Under this arrangement the Newport News Co. will be the only concern to get a contract for building three vessels.

Admiral Bradford, chief of the naval bureau of equipment, has invited Nikola Tesla, the electrical inventor, to submit for trial a system of wireless telegraphy developed by him. Mr. Tesla, in a recent interview with Admiral Bradford, claimed to be able to provide the navy with a system of wireless telegraphy equal to, if not superior to, the Marconi system.

DEVELOPMENT OF IRON INDUSTRY IN CANADA.

Within the past year Canada has certainly made a move towards supplying its wants in iron and steel. Up to a short time ago there were practically no iron smelting works in the dominion. The government bounty on pig iron has undoubtedly had much to do with the progress of the past year, as noted in the following summary of new enterprises from Toronto:

No industry in Canada has shown more remarkable progress during the past year than that connected with the production of iron, and none in Canada has a more promising future than the one in question. So enthusiastic are some of the people interested in it that they declare the Canadian iron industry will, in the future, have a more important bearing on the industrial development of the dominion and be of more value to the country than its gold mines, not excluding those in the rich gold fields of the Klondike. The product of the Canadian smelters is eagerly sought by Canadian manufacturers, and good prices are obtained for the iron in the home markets. There is still room for the industry to grow, because while the production of iron in Canada at present is only 100,000 tons annually, the consumption is at least 800,000 tons a year.

There are now four iron smelting works in Canada, and three of them are in Ontario, while the other is in Sydney, Nova Scotia. One is at Hamilton, which has been working successfully for years; another is at Deseronto, Ont., and the third is at Midland, on Georgian bay, Lake Huron, this latter having been formally opened only a few days ago. This latest addition is owned by the Canada Iron Furnace Co., the prime movers in the enterprise being George E. and T. J. Drummond and J. T. McCall of Montreal. It is hoped that with the new enterprise at Midland the supply of native iron will come much nearer to the requirements of the Canadian manufacturers. And as the demand increases, as it is considered certain to do when the superior grade of the Canadian ore is understood, the Midland company intends to increase its capacity for smelting the Canadian ore, and it is expected that the iron industry will so develop in time that not only the iron users of Canada will be able to secure all the iron they need in the home market, but that the Canadian smelting companies will export their product to foreign markets. The harbor at Midland is an excellent one, having a depth of 20 ft., and the company has made arrangements with the railways for the carriage of their product from the smelter east at favorable rates. The new smelter is thoroughly up to date in every respect, has a capacity of 150 tons a day, and has been so constructed that it can be easily increased.

The Clergue mines at Michipicoten, Lake Superior, are favorably situated for the cheap transportation of the ore to this smelter. The mines can be operated at a comparatively low cost, as vast quantities of ore are lying on the surface, requiring only to be loaded on the cars now running into the mine. The ore is of a high grade, and has been pronounced by experts to possess all the qualities required in general structural work, and, in fact, for all sorts of light and heavy iron work. The first product of the Midland smelter was purchased by a large stove manufacturer of Toronto, who intends to use it in his foundry.

The smelting works at Sydney, in Nova Scotia, have attracted much attention from capitalists in the United States as well as in Canada. The work there is being carried on on a very large scale. From a comparatively quiet town a few years ago, Sydney has in the past eighteen months developed into one of the most active industrial centers of the kind in the dominion. Within a few days past the parties interested there have arranged for the placing of $5,000,000 additional capital in their enterprises in order to enlarge their plant and extend the scope of their business. It is now proposed to turn out ship plates and steel rails. The initiatory steps have already been taken to that end, and it is expected that before the end of 1902 the new industry will be in going order. It is hoped that in connection with this proposed new industry ship building in the east will show renewed vigor, and on an extensive scale never before deemed possible in Canada. The Sydney works are favorably situated for the export business, in the development of which the capitalists hope for great results in the way of extending their output.

DETROIT'S NEW FIRE FIGHTER.

A successful builders' trial trip was given last Saturday to the new fire tug for the city of Detroit, built by the Detroit Ship Building Co. under the supervision of Frank E. Kirby, designer of hull and machinery. It is calculated by the builders that the fire boat will make 14 miles an hour at maximum speed. The trial was in every way satisfactory. Mr. Kirby said:

"In the matter of speed the Battle will be practically as effective when under way as though she made 20 miles an hour. In going from point to point along the city's water front, or to the extreme ends of the frontage, a difference of three or five miles in speed counts for nothing, the distance to run being so short. Anyway, it is impossible to make a fast fire-fighter, so full and bluff at the bow must the hull be to hold all the machinery necessary. In designing this craft one of the chief objects was to arrange for the largest possible amount of machinery, etc., in the smallest possible space. But this craft has the model and power necessary to the first-class ice breaker, and the Battle will be second to none around here in that line. She will have about the same ice crushing capacity as has the ferry Promise. So in the depth of a hard winter, with the river choked up with thick ice, the Battle will be able to break her way through any of it in order to get to a fire, and this was another most important point to be considered in designing the craft."

CRAMPS WILL BUILD A CRUISER FOR TURKEY.

The Cramps have secured a contract for a cruiser from the Turkish government. A while ago there were rumors to this effect but they have now been verified. The contract was made by the minister of marine on behalf of Turkey and by Gen. Williams on behalf of the Cramps. The new cruiser will be about of the same size as the Cleveland class, that is 3,200 tons. She will be 300 ft. long, 42 ft. beam and will be designed to maintain a speed of 22 knots an hour. Her engines will be triple expansion, twin screws, and her boilers will be of the water tube kind. It is the general impression that the indemnity due to American citizens who suffered during the Armenian outrages will be included in the purchase price of the cruiser. How true this may be is not known, but it would not be surprising.

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A review of things at the end of the century suggests itself as an entertaining if not an original subject. Doubtless that great race of giants who lived in the latter part of the eighteenth century—Washington, Jefferson and Franklin in the United States, Chatham, Burke, Pitt, Johnson in England, and Napoleon and Tallyrand in France—were wont to contrast the achievements of the eighteenth with those of the seventeenth. The fact that their reviews and prophecies were not handed down to us lies in that they were made by word of mouth. Paper was not made from wood pulp in those days nor did presses turn off the printed page at the rate of 300 per minute. It was doubtless inconceivable to them that the nineteenth century could duplicate the eighteenth as it is inconceivable to us that the twentieth can equal the record of the nineteenth. Man's standards are always in the past and it is instinct to turn to them. There is reason, however, to believe that the nineteenth will go unchallenged among the centuries. Assuredly the vacancies for inventions are few. The amount of territory unexplored is little. The twentieth century cannot do much more than apply the great principles which the nineteenth century has discovered. There is much of value lying latent. The scientist invariably precedes the artisan. The Review will not attempt to chronicle the progress of the nineteenth century, to enumerate its bequests from the eighteenth and what it bequeathes to the twentieth. The gold it borrowed it has certainly stamped with its own image. If anyone were to ask us what in a material and physical sense, was the distinguishing accomplishment of the nineteenth century we would unhesitatingly answer the annihilation of distance. To this one thing is due the marvelous progress of the age. It is the foundation of all great fortunes. The enormous personal estates which today stagger us with their stupendousness could not possibly have been created under the conditions which existed during the eighteenth century. Men during the eighteenth century lived and died pretty much in the places in which they were born. Trade expansion was a minus quantity. The shoemaker made shoes for his village; he rarely made shoes for the neighboring villages. The same condition obtained throughout all the avenues of employment. Trades were restricted to the narrowest limits. The known world was little; the unknown world immense. The improvement of transportation facilities brought the world together. It made the occident the competitor of the orient.

But we will not wide scatter o r shot. We will simply take one phase of nineteenth century development—these wonderful great lakes containing a third of the fresh water of the world and the cities which have sprung about their shores. Nowhere in the world can such development be shown as is revealed along these lakes. One hundred years ago the woodsman's axe had not felled a single tree along the shores of the greatest of them—the majestic Lake Superior. Indeed that same condition was literally true fifty years ago. The development of lake commerce dates from the time that iron ore was discovered in the upper peninsula of Michigan—discovered in such immense quantities as to confound credibility. This discovery was made in 1844 by William Burt, a surveyor who had invented the solar compass. While in the vicinity of what is now the present city of Negaunee the needle began to fluctuate in such a manner as to greatly excite the old gentleman. When it pointed due east he ordered his staff to search around for evidences of mineral deposits and piously exclaimed: "What would they do in surveying this country without my compass?" He seems to have regarded the demonstration of the utility of his compass as of vastly more importance than the deposits themselves, for neither he nor his party made any effort to profit by his discovery. His surveyors in searching about found iron ore in abundance. Indeed they could scarcely fail to find it since it lay exposed to view in great abundance and purity. They told the tale of their discovery to the Indians whom they met in the peninsula, but appear to have made no further effort to record it. The following year Philo M. Everett of Jackson, Mich., led a party into the peninsula to locate copper deposits which Dr. Houghton, commissioner of minerals, had spoken of in his annual reports some few years previously. Everett knew nothing of the discovery of iron until he reached Sault Ste. Marie, when an Indian told him of it. He guided Everett and his party to the spot, or as near to the spot as his superstition would let him come. The actual discovery was made by S. I. Carr and E. S. Rockwell, two members of Mr. Everett's party, and a permit to pre-empt the land was taken out in the name of James Ganson. They called the mine the Jackson mine. Immense quantities of ore have since been realized from it. Everett's party organized a company of which Abram V. Berry of Jackson, Mich., was made president. The following year Dr. J. Lang Cassels, a noted mineralogist, went into the peninsula on behalf of a number of Cleveland men to investigate the mineral deposits with particular reference to silver and copper. Iron had not especially entered into his catalogue. At the Sault he met Mr. Berry, who was returning from the Jackson mine. Berry was aware of another location two miles further inland from the Jackson and it had been his intention to pre-empt it. Upon receiving assurances from Dr. Cassels, however, that it were better for two to guard and improve the interests, he made known to him the location and loaned him his canoe to be used to navigate the Carp river when he should come to that stream. Dr. Cassels speedily discovered the deposit and took out a permit to pre-empt it in the name of Lorenzo Dow Burnell. This location was called the Cleveland mine. About that time Dr. Edmund C. Rogers of adventurous spirit entered the peninsula and assisted for awhile in the improvement of the Cleveland location. Then he undertook the pre-emption of a third deposit for himself a mile or more away from the Cleveland location. Isaiah Briggs, whose duty it was to pack provisions for the surveyors within a radius of twenty miles, had built a little shanty for himself and his pony upon this third location and used it as a half way station. When the land sale took place at the Sault in 1850 all the pre-emptors were there to prove their claims. Dr. Rogers, however, was becalmed on the lake and did not reach the land office on the day of the sale. Briggs was there and upon the strength of his shanty proved his claim without dispute on behalf of John Burt. This location became known as the Lake Superior mine. These were the three great original companies—the pioneers, who took all the hard knocks together and worked out the problem of mining and transportation through an unbroken wilderness, who developed an Indian trail into a steam railway and furnished the leaven which transformed the rapids at the Sault into a navigable canal. They are mentioned merely because they are the first. There are others as big but lack the historical significance which attaches to these.

The first shipment of ore through the Sault canal was made on the brig Columbia on Aug. 17, 1855. It consisted of 132 tons and was shipped by the Cleveland Iron Mining Co. to Cleveland. In all the company shipped 1,449 tons of ore during the year, which represented the total shipments of the entire peninsula. This same company had in 1853 sent 153 tons of ore to the Sharon Iron Co., Sharon, Pa. This ore, of course, had to be hauled over the portage at the Sault. It was delivered at Erie and constituted the first Lake Superior ore ever used in a blast furnace. Shipments, commercially considered, must be reckoned from 1855. From the modest total of 1,449 tons in 1855 the annual production has increased to 18,570,315 tons in 1900 and with the later discoveries in Minnesota the Lake Superior district has yielded a total since the beginning of 170,929,906 tons. Around these deposits villages, towns and cities have sprung; they have caused the pendulum of the world's production of iron and steel to swing west of the Alleghenies; they have brought into existence a fleet of vessels outrivaling the great coastwise fleet of the United States; hundreds of thousands draw their sustenance from these deposits; the very bulwark of the industrial strength of the nation is in them; the trades of which they are the body are innumerable and extend in all directions; they have quickened the pulse of industry throughout the continent—these apparently inexhaustible deposits of the Lake Superior region. They have meant much to the century, or rather to the half century. The century found it a wilderness and has lifted it into the light of commerce; the century found only the birch bark canoe upon the waters, the half century nothing better than the 65-ft. schooner Algonquin, but the full century bequeaths the Presque Isle and her splendid sisters; the century found nothing but the unbroken shore, the half century the flat dock and the wheelbarrow; the full century the magnificent docks with trestle work and ore pockets from which 6,000-ton steamers may be loaded in three or four hours. There is no story of development so compact and yet so widespreading in its influence. No mention is made here of the immense copper deposits of the district, which, while representing far greater intrinsic value, have far less industrial importance.

The men who are now active in the world's affairs have no precedents to guide them. They are engaged in solving original problems—problems which did not exist twenty-five years ago. The revolution in commercial policy wherein the small business with large profits is substituted for the large business with small profits is a development of recent years. The tendency to control a business from the raw material to the finished product presents a condition the like of which has never been known before. The men of today have no antecedents. The twentieth century is its own ancestor.

To sum it briefly in a line the Marine Review published during the year 1900 a total of 2,043 headed articles and 434 illustrations. Each of the fifty-two issues contained an average of 26,000 words and eight illustrations of a page or less in size. Of course there were published a great number of articles without heads but only the headed ones have been taken into consideration. These articles embraced essays, addresses and specially prepared papers upon a great variety of subjects. Everything in the naval and merchant marine fields was fully and promptly covered. Topics which required careful research were gone into exhaustively, and those which did not were dismissed with the fewest possible words. Publication days, just one week apart, allow sufficient time to treat a subject carefully and are sufficiently near to handle its news features with timeliness. We do not think that there was anything moving in a maritime line that the Review did not have. It aimed to make a discriminating digest of everything pertaining to ships. It spared neither money nor labor to attain that end. In all modesty we do not think that any similar publication in the country approached the record of the Review either in the exhaustive character of its articles or in the promptitude in which they were conveyed to the public. The record of the past is an index of the future.

SHIP BUILDING RETURNS OF THE UNITED KINGDOM.

From Fairplay, London.

We give below a summary of the ship building returns of the United Kingdom for 1900, the figures for 1899 being presented for the purpose of comparison. We have endeavored to obtain the gross register of the vessels as measured by the board of trade, but in some of the returns much larger tonnages are shown than the vessels measure by the board of trade rules, and would appear to include cattle spaces, in the case of cattle-carrying steamers, and many other spaces which board of trade surveyors would exclude from their measurements. The returns are therefore misleading to that extent. We have, however, placed an asterisk against the totals where erections, etc., are included in the gross tonnages, and at the end of the table will be found a list showing approximately what the tonnages would be according to the board of trade figures.

Messrs. Wm. Gray & Co. have this year launched the largest amount of tonnage, their output being twenty-four vessels of 74,191 tons gross (or 81,794 tons gross if the tonnages of the shelter decks and part shelter decks were included), against 77,501 tons gross last year. Messrs. Harland & Wolff, who last year held the premier position, come second with a total of six vessels of 67,845 tons gross (or 73,897 tons gross including erections). The largest vessel put into the water during the year was the tramp steamer Minnehaha of 13,403 tons gross, by Messrs. Harland & Wolff. The following figures show the amount of merchant and war tonnage put into the water from the principal private British yards during the year—with the exception of Messrs. Wigham, Richardson & Co., whose total had not arrived at the time of going to press—as compared with the eight preceding years:

Launched in 1900, 854 vessels of 1,507,344 tons gross.
Launched in 1899, 755 vessels of 1,518,481 tons gross.
Launched in 1898, 794 vessels of 1,488,130 tons gross.
Launched in 1897, 635 vessels of 1,016,066 tons gross.
Launched in 1896, 743 vessels of 1,257,339 tons gross.
Launched in 1895, 630 vessels of 1,028,708 tons gross.
Launched in 1894, 637 vessels of 1,052,779 tons gross.
Launched in 1893, 545 vessels of 849,881 tons gross.
Launched in 1892, 702 vessels of 1,210,657 tons gross.

	No. of ships.	Total gross tons, 1900.	Total gross tons, 1899.
1 Wm. Gray & Co., West Hartlepool	24	74,191	77,501
2 Harland & Wolff, Belfast	6	67,845	82,634
3 Workman, Clark & Co., Belfast	12	56,201	45,018
4 Russell & Co., Port Glasgow	17	54,415	52,465
5 Sir W. G. Armstrong, Whitworth & Co., Newcastle	14	46,237	57,543
6 C. S. Swan & Hunter, Wallsend	9	*42,880	42,522
7 Ropner & Son, Stockton	12	*42,263	39,977
8 Sir James Laing & Sons, Sunderland	8	*40,307	34,384
9 Richardson, Duck & Co., Stockton	9	*36,253	34,117
10 Wm. Doxford & Sons, Sunderland	9	34,829	29,543
11 Alex. Stephen & Sons, Linthouse	6	34,555	20,530
12 Sir Raylton Dixon & Co., Middlesbrough	7	*34,244	34,075
13 Furness, Withy & Co., West Hartlepool	6	33,879	38,095
14 Palmers Ship Building Co., Jarrow	7	*33,808	42,683
15 Northumberland Ship Building Co., Howdon-on-Tyne	7	*32,432	20,300
16 C. Connell & Co., Glasgow	6	32,316	33,183
17 Wm. Denny & Bros., Dumbarton	16	30,603	31,300
18 Scott & Co., Greenock	6	29,970	20,544
19 J. L. Thompson & Sons, Sunderland	7	29,399	36,013
20 D. & W. Henderson & Co., Glasgow	6	29,045	15,323
21 Vickers, Sons & Maxim, Barrow	4	27,907	32,672
22 J. Brown & Co., Clydebank	—	26,250	41,400
23 Irvine's Ship Building Co., West Hartlepool	6	*25,472	24,004
24 R. Craggs & Sons, Middlesbrough	6	*24,080	14,384
25 Short Bros., Sunderland	7	24,003	30,060
26 John Readhead & Sons, South Shields	7	23,919	*27,133
27 R. & W. Hawthorne, Leslie & Co., Hepburn	6	23,765	28,574
28 Wm. Hamilton & Co., Port Glasgow	8	*23,482	25,865
29 Caird & Co., Greenock	3	22,714	14,036
30 Napier & Miller, Yoker	14	21,918	7,709
31 Craig, Taylor & Co., Stockton	7	20,588	19,022
32 J. Priestman & Co., Sunderland	4	*20,362	20,240
33 A. Rodger & Co., Port Glasgow	8	19,615	14,501
34 J. Blumer & Co., Sunderland	6	18,679	18,005
35 Bartram & Sons, Sunderland	5	18,530	14,529
36 W. Pickersgill & Sons, Sunderland	6	18,086	17,187
37 Fairfield Ship Building Co., Govan	3	17,765	31,624
38 Barclay, Curle & Co., Whiteinch	3	17,650	20,976
39 Sunderland Ship Bldg. Co., Sunderland	4	16,388	26,163
40 Wm. Simons & Co., Renfrew	12	15,700	12,000
41 Tyne Iron Ship Building Co., Willington Quay-on-Tyne	5	15,236	14,545
42 A. McMillan & Son, Dumbarton	5	15,010	21,273
43 Wm. Dobson & Co., Newcastle	5	*14,367	13,262
44 R. Thompson & Sons, Sunderland	5	13,698	17,650
45 R. Duncan & Co., Port Glasgow	4	12,000	9,230
46 Caledon Ship Building Co., Dundee	6	11,632	4,957
47 R. Stephenson & Co., Hepburn	3	11,613	12,601
48 Grangemouth & Greenock Dock Yard Co.	8	11,291	7,689
49 G. Rennie & Co., Greenwich	59	9,405	—
50 Osbourne, Graham & Co., Sunderland	3	9,370	9,489
51 Wood, Skinner & Co., Newcastle	9	9,251	11,293
52 Ramage & Ferguson, Leith	5	9,017	3,029
53 D. J. Dunlop & Co., Port Glasgow	2	8,320	6,600
54 S. P. Austin & Son, Sunderland	4	8,188	11,368
55 Lobnitz & Co., Renfrew	26	8,100	7,062
56 Blyth Ship Building Co., Blyth	4	7,637	10,663
57 A. & J. Inglis, Glasgow	6	7,451	13,080
58 Londonderry Ship Building Co., Londonderry	4	7,020	3,680
59 A. W. Robertson & Co., Canning Town	58	6,860	5,795
60 Gourlay Bros. & Co., Dundee	4	6,830	10,230
61 Mackie & Thomson, Govan	18	6,301	5,920
62 Wm. Beardmore & Co., Govan	3	6,250	14,700
63 Cook, Welton & Gemmell, Hull	31	6,148	5,243
64 Ailsa Ship Building Co., Troon	10	5,697	6,139
65 Earle's Ship Building Co., Hull	10	4,731	10,170
66 Laird Bros., Birkenhead	7	4,705	9,634
67 London & Glasgow Ship Building Co., Glasgow	1	4,700	11,483
68 Campbeltown Ship Building Co., Campbeltown	3	4,473	9,063
69 J. Reid & Co., Whiteinch	3	4,296	3,464
70 Hall, Russell & Co., Aberdeen	17	4,204	8,954
71 Cochrane & Cooper, Beverley	23	3,921	7,453
72 W. Harkess & Son, Middlesbrough	4	3,601	2,567
73 Smith's Dock Co., North Shields	22	3,565	4,432
74 Murdock & Murray, Port Glasgow	12	3,351	6,518
75 Fleming & Ferguson, Paisley	9	3,300	4,400
76 Dundee Ship Builders' Co., Dundee	3	3,025	2,721
77 J. Jones & Sons, Liverpool	13	2,802	2,040
78 Strand Slipway Co., Sunderland	2	2,610	3,876
79 Bow, McLachlan & Co., Paisley	14	2,602	—
80 J. Fullerton & Co., Paisley	7	2,366	2,379
81 J. P. Rennoldson & Sons, South Shields	6	2,206	2,474
82 R. Williamson & Son, Workington	4	2,034	2,141
83 Mordey, Carney (Southampton)	14	2,015	—
84 J. T. Eltringham & Co., South Shields	10	1,679	1,425
85 Ritson & Co., Maryport	9	1,624	1,376
86 Irvine Ship Building Co., Irvine	3	1,620	3,410
87 Ritchie, Graham & Milne, Glasgow	11	1,620	2,555
88 C. H. Walker & Co., Sudbrook	3	1,321	1,840
89 Scott & Sons, Bowling	7	1,264	1,652
90 S. McKnight & Co., Ayr	3	1,215	2,440
91 A. Hall & Co., Aberdeen	6	1,075	1,019
92 E. Finch & Co., Chepstow	10	1,000	—
93 Hawthorns & Co., Leith	3	806	1,633
94 Edwards & Co., Millwall	13	427	—
95 J. Shearer & Son, Kelvinhaugh	1	264	964
96 J. Cran & Co., Leith	1	22	26

In the above list the tonnages marked with an asterisk would appear to be the gross tonnages including erections. According to the board of trade measurements the output of the firms referred to would be approximately as follows, and these figures have been adopted in arriving at the total—1,507,344 tons:

	No. of ships.	Total gross tons, 1900.
C. S. Swan & Hunter, Wallsend	9	39,400
Ropner & Son, Stockton	12	39,215
Sir James Laing & Sons, Sunderland	8	34,229
Sir Raylton Dixon & Co., Middlesbrough	7	32,022
Richardson, Duck & Co., Stockton	9	31,755
Northumberland Ship Building Co., Howdon-on-Tyne	7	30,288
Palmers Ship Building Co., Jarrow	7	25,517
Irvine's Ship Building Co., West Hartlepool	6	23,144
Wm. Hamilton & Co., Port Glasgow	8	21,870
R. Craggs & Sons, Middlesbrough	6	22,970
J. Priestman & Co., Sunderland	4	16,372
Wm. Dobson & Co., Newcastle	5	12,831

CONSOLIDATION OF THE CRAMPS.

It is reported in financial circles in New York that the Cramps-Vickers' Sons & Maxim consolidation will be completed in a short time. It is said that a representative of a prominent English firm sailed for this country last Saturday to perfect the amalgamation. It is claimed that the $10,000,000 new 4½ per cent. debenture bonds have already been underwritten in London, New York and Philadelphia, the Morton Trust Co. handling the issue in New York. The proceeds of $1,500,000 of these bonds will be used to retire the Cramp Co. 5 per cent. bonds at 110. According to a news agency the proceeds of $7,500,000 of the new issue will be invested in a steel plant, but whether the Midvale plant will be purchased has not been determined. Five million dollars of new 6 per cent. cumulative preferred stock is to be exchanged share for share for the present Cramp stocks, nearly $5,000,000 outstanding, which now pays 5 per cent. A syndicate stands ready to take the remaining $5,000,000 of new preferred stock, which will inject that much new capital into the combined business. The $10,000,000 new common stock will be taken by Vickers' Sons & Maxim interests and will pay the cost of the American banking operations. It is planned to finance the entire operation on a 5 per cent. basis. An officer of the Morton Trust Co. said that he had nothing to say regarding the deal. A representative of the banking house of J. & W. Seligman & Co. of New York said Mr. Henry Seligman, the only person who could talk on the subject, was out of town.

NEARLY A MILLION HORSE POWER.

A letter from Delaunay, Belleville & Co., manufacturers of the French Belleville boiler, informs the Review that the British admiralty has decided upon Belleville boilers for the cruisers Berwick, Cumberland, Lancaster and Donegal, the generators to be equipped with economizers. These four new applications will bring the total of British ships provided with Belleville generators up to sixty-one, representing a total of 981,900 H. P.

A meeting of steel plate manufacturers of the United States is to be held in New York this week, and it is expected that another advance will be made in the price of plates.

APPROPRIATIONS FOR RIVERS AND HARBORS.

A LIST OF ITEMS OF $15,000 OR MORE IN THE RIVERS AND HARBORS BILL AS REPORTED TO THE HOUSE OF REPRESENTATIVES.

APPROPRIATIONS FOR HARBORS.

	Cash appropriations for next fiscal year.	Amounts authorized.
Maine:		
Carvers harbor, Vinalhaven	$39,000	.....
Isle of Shoals	30,000	.....
Vermont:		
Burlington harbor	25,000	.....
Massachusetts:		
Boston harbor, new project	600,000	$3,000,000
Boston harbor, general improvement	163,000	.....
Nantucket, harbor of refuge	30,000	.....
Newburyport	30,000	.....
Plymouth	20,700	.....
Scituate	15,000	.....
Hyannis, harbor of refuge	15,000	.....
*Sandy bay, Cape Ann, harbor of refuge	200,000	.....
Gloucester	100,000	202,083
New Bedford	37,700	.....
Woods Hole channel	20,000	.....
Fall River	38,000	117,411
Rockport, piers and breakwater	22,481	.....
Lynn	25,000	.....
Rhode Island:		
Newport	39,200	.....
Connecticut:		
New Haven, breakwater	44,000	.....
New London	25,000	120,000
New York:		
Buffalo	50,000	.....
Ogdensburg	15,000	.....
Oswego	48,000	.....
New York harbor	37,500	.....
Saugerties	20,832	.....
Olcott	15,000	.....
Tonawanda harbor and Niagara river	257,700	.....
Gowanus channel	20,000	.....
Buttermilk channel	300,000	1,500,000
Buffalo at Erie basin and Black Rock harbor	200,000	614,643
Cape Vincent	48,000	.....
Dunkirk	84,827	.....
New Jersey:		
Rariton bay	45,000	.....
Kill von Kull and Arthur Kill	100,000	596,000
Pennsylvania:		
Erie	125,000	.....
Maryland:		
Spring Garden, Southwest Baltimore	88,000	221,000
Virginia:		
Norfolk harbor	20,000	.....
South Carolina:		
Charleston	60,000	.....
Georgia:		
Brunswick	125,700	.....
Savannah	50,000	.....
Savannah, new project	.....	1,000,000
Darien	15,000	.....
Doboy bar	20,000	.....
Brunswick, outer bar	25,000	.....
Florida:		
Apalachicola bay	41,000	.....
Pensacola	70,000	.....
Key West, improving entrance to harbor	25,000	.....
Dredge for river and harbor improvements in Florida	20,000	.....
Hillsboro bay	150,000	.....
East Pass, Carrabelle harbor	20,000	.....
Alabama:		
Mobile	400,000	.....
Louisiana:		
Calcasieu, mouth and passes of river	35,000	.....
Southwest Pass, Mississippi river	550,000	2,950,000
Texas:		
Galveston harbor	500,000	1,000,000
Sabine Pass	100,000	.....
Aransas Pass	350,000	.....
Sabine Pass extension	25,000	.....
Ohio:		
Ashtabula	50,000	.....
Black River (Lorain harbor)	20,000	.....
Cleveland	600,000	2,200,000
Cleveland harbor, dredging	125,000	.....
Fairport	150,000	.....
Huron	25,000	.....
Sandusky	100,000	.....
Conneaut	75,000	342,000
Indiana:		
Michigan City, outer harbor	15,000	.....
Illinois:		
Waukegan	100,000	245,000
Michigan:		
Charlevoix	20,000	.....
Frankfort	54,500	.....
Grand Marais, harbor of refuge	70,000	.....
Manistee	42,000	.....
Holland, Black Lake	73,000	.....
Muskegon	75,000	.....
Pentwater	20,000	.....
Portage Lake, refuge	33,800	.....
White Lake, harbor	15,000	.....
Marquette	26,000	80,000
Ludington	36,000	185,000
Petoskey	15,000	.....
Saugatuck	15,000	.....
Wisconsin:		
Milwaukee, harbor of refuge	119,000	.....
Milwaukee harbor	51,000	.....
Racine	17,000	.....
Sheboygan	30,100	.....
Sheboygan, new project	48,100	.....
Ashland	40,000	.....
Two Rivers harbor	20,000	.....
Sturgeon Bay and Lake Michigan ship canal	73,500	178,000
Manitowoc breakwater	37,000	.....
Port Wing	25,000	.....
Minnesota:		
Burlington Bay	200,000	235,000
California:		
San Diego	50,000	217,850
San Luis Obispo	50,000	.....
San Francisco harbor, removal of Blossom rock	.....	.....
Oregon:		
Tillamook Bay and bar	27,000	.....
Washington:		
Olympia harbor	25,000	.....
Tacoma	30,000	.....
New Whatcom harbor	15,000	.....

APPROPRIATIONS FOR RIVERS.

	Cash appropriations for next fiscal year.	Amounts authorized.
Maine:		
Lubec channel	25,000	.....
Kennebec, Gardiner to Augusta	20,000	.....
New Hampshire:		
Cocheco river	30,000	.....
Vermont:		
Narrows of Lake Champlain, New York and Vermont	17,500	.....
Massachusetts:		
Mystic river below the mouth of Island End river	50,000	.....
Merrimac river	30,000	.....
Survey of Connecticut river	25,000	.....
Rhode Island:		
Pawtucket river	28,500	.....
Providence river and Narragansett Bay	75,000	.....
Connecticut:		
Connecticut river below Hartford	20,000	.....
Pawcatuck river, Connecticut and Rhode Island	15,000	.....
Thames river	15,000	.....
New York:		
Hudson river	200,000	.....
Harlem river	100,000	.....
East river and Hell Gate	200,000	.....
Patchogue river	20,000	.....
Grasse river	75,000	.....
New Jersey:		
Passaic river	75,000	221,000
Rariton river	25,000	.....
Mantua creek	25,000	.....
Raccoon creek	15,000	.....
Pennsylvania:		
Allegheny river	18,000	.....
Delaware river, New Jersey, Pennsylvania	600,000	2,400,000
Monongahela river	200,000	436,913
Washington, D. C.:		
Potomac river	75,000	.....
Virginia:		
James river	250,000	.....
Rappahannock river	25,000	.....
North Carolina:		
Cape Fear river at or below Wilmington	140,000	.....
Neuse river	15,000	.....
Pamlico and Tar rivers	25,000	.....
South Carolina:		
Santee river	20,000	.....
Ashley river	25,000	.....
Georgia:		
Chattahoochee river, Georgia and Alabama, below Columbus	85,000	.....
Flint river	25,000	.....
Oconee river	15,000	.....
Coosa river between Rome and railroad bridge	59,000	174,845
Coosa river between Wetumpka and railroad bridge	15,000	.....
Florida:		
Choctawhatchee river, Florida and Alabama	16,000	.....
St. Johns river from Jacksonville to ocean	35,000	950,000
St. Johns river at Orange Mills Flats	30,000	.....

	Cash appropriations for next fiscal year.	Amounts authorized.
Alabama:		
Alabama river	20,000	.....
Warrior river	350,000	400,000
Tombigbee river, from mouth to Demopolis	15,000	.....
Mississippi (state):		
Big Sunflower river	20,000	.....
Yazoo river	45,000	.....
Louisiana:		
Red River, Louisiana and Arkansas	100,000	.....
Texas:		
Trinity river	150,000	600,000
Brazos river, mouth of	30,000	.....
*Galveston ship channel and Buffalo bayou	310,000	300,000
Brazos river between Velasco and Richmond	50,000	.....
Arkansas:		
Arkansas river, Arkansas	75,000	.....
Arkansas river, removing obstructions, operating snag boats	35,000	.....
Ouachita and Black rivers, Arkansas and Louisiana	20,000	.....
Upper White river	270,000	.....
Tennessee:		
Cumberland river above Nashville	105,000	.....
Cumberland river below Nashville	180,000	.....
Tennessee river below Riverton	25,000	.....
Tennessee river, Chattanooga to Riverton	90,000	.....
Tennessee river above Chattanooga	50,000	.....
Kentucky:		
Big Sandy river, Tug Fork and Louisa Fork	30,000	.....
Licking river	100,000	207,000
Ohio:		
Ohio river	400,000	.....
Dam at Cullums Ripple	100,000	950,000
Locks 8, 11 and 14	150,000	750,000
Michigan:		
Saginaw river	40,000	.....
Grand river	125,000	.....
Detroit river	500,000	1,250,000
St. Clair Flats canal	330,000	.....
West Neebish	500,000	4,000,000
Wisconsin:		
Fox river	60,000	.....
Indiana:		
Wabash river below Vincennes	35,000	.....
Illinois:		
Calumet river, Illinois and Indiana	75,000	.....
Illinois river	75,000	.....
Survey, deep waterway	200,000	.....
Mississippi river:		
Reservoirs at head waters	300,000	.....
River from the head of the passes to the mouth of the Ohio	2,500,000	5,000,000
Harbor at New Orleans, La.	110,000	.....
Harbor at Natchez, Miss., and Vidalia, La.	50,000	.....
Rectification of Red and Atchafalaya rivers	25,000	.....
Harbor at Memphis, Tenn.	70,000	.....
Between Missouri river and St. Paul, Minn.	1,300,000	2,600,000
Missouri river:		
General improvement between Sioux City and the mouth	300,000	.....
Removal of obstructions above Sioux City	40,000	.....
California:		
Sacramento and Feather rivers	18,000	.....
Oregon:		
Columbia river at the Cascades	30,000	.....
Mouth of Columbia river	400,000	1,500,000
Lower Willamette and Columbia rivers below Portland	225,000	.....
Willamette river above Portland, and Yamhill river	70,000	.....
Coquille river, general improvement	40,000	.....
Siuslaw river, mouth of	26,000	.....
Washington:		
Swimonish Slough	20,000	.....
Okanogan river	15,000	.....
Examinations, surveys and contingencies of rivers and harbors, inspection of bridges, etc.	200,000	.....

*The appropriations made for Sandy bay, Cape Ann, harbor of refuge, and for Galveston ship channel and Buffalo bayou are not to be expended unless the projects receive the approval of a board of engineers to be appointed to reexamine and report upon them.

WORK OF THE CLEVELAND PUNCH & SHEAR WORKS CO.

A note from the Cleveland Punch & Shear Works Co., Cleveland, is to the effect that they anticipate a very prosperous year. Their erecting shop, which has been in process of construction for some time past, is now nearly completed, and soon after the first of the year they expect to be in shape to make much better deliveries. The new shop will have a complete electrical equipment, including traveling crane, and will be a modern in all respects. They have recently shipped tools as follows: A 25-ft. plate planer to the National Tube Co., McKeesport, Pa.; two 19-in. throat punches to S. B. Rheam & Co., Pittsburgh; special "I" beam punch with 21-in. throat to the Brown-Ketcham Iron Works, Indianapolis; 44-in. throat punch on the order of the Pratt & Whitney Co., New York; one 30-in. throat punch, one 10-in. throat punch, and one 12-ft. radial drill to the Browning Engineering Co. of Collinwood, O.; bending and strengthening machine to the Meehan Boiler & Construction Co., Lowellville, O.; a 50-in. rotary planer with 12-ft. bed, and a 15-ft. radial drill to the Hay Foundry & Iron Works, Newark, N. J.; No. 5 bar shear, capacity to cut 4x4 in. billets cold, to the J. B. Carr Co., Troy, N. Y.

QUESTION OF MARINE INSURANCE.

CHANGES THAT HAVE COME OVER THE BUSINESS ON THE GREAT LAKES—A BUFFALO VIEW OF THE SITUATION.

(Special Correspondence to the Marine Review.)

Buffalo, Jan. 2—Changes that have taken place in the methods of conducting the insurance business of the lakes in recent years are so great that they merit a special note, especially as they are now such as to bring the entire business fairly into line with the ocean underwriting. In the matter of length of policy is this more noticeable than in anything else. Till quite lately it was the rule to write all policies for the season only and to spend the entire winter in closing up this business of about eight months activity and finding whether there was a balance in favor or against the companies. Of course there was always more or less of a remnant of unfinished business when the lakes opened again. There was the captain who failed to call attention to the fact that he had sustained a loss till it was too late to get the adjustment complete in time, and there was the loss that was so complicated and intricate that the adjustment was a matter of months of labor, not to mention the lawsuits that hung on year after year. In the latter regard this end of the lakes was especially handicapped on account of there being no United States judge resident here, the nearest one being Judge Coxe at Utica, whose very locality so far inland made him slow to carry such business to a result. For some reason, however, the number of new cases that have found their way on the calendar of the United States district court here of late years appears to have grown fewer at such a decided rate that our new Buffalo judge, Hazel, has not been called on to thrash over any great amount of old straw.

The new marine policy is now an annual one to such a great extent that there will no longer be much of a lake "season" in the sense of former seasons and there will not any longer be occasion for the old-time squabble over new rates, that sometimes occupied all the latter part of winter, up to the very day of the opening of navigation. Such scoring up will hardly be necessary now. There are policies extending to next October and many others that run well into next season. Besides, the older lake underwriters, who appeared to look forward to the rate-making season with a sort of grim satisfaction, are chiefly gone, leaving the business in very conservative hands.

There is a new branch of hull insurance that does much towards obliterating the "season," and that is the need of setting aside a reserve to meet a possible loss after the close of the year. It is the tendency of the business to issue annual policies more and more and the possible demands of these policies must be met whenever a balance is to be struck. It will not answer to consider the vessel's liability to burn up and nothing more as soon as she is tied up. There is now commonly a large remnant of unearned premium to carry her into disaster perhaps next season.

So it is not an easy thing to say whether the season's earnings have been this or that. Even with practically not a first-class vessel lost in 1900 there is a great mass of partial losses to look after yet, most of which are of more uncertain adjustment than if the loss were total. Still this is not a case where changes have added to the complications of the business. The marine underwriting of the lakes will have to be set down as being on a better basis than ever before, so that the tendency here outlined will no doubt go on till the annual policy is the rule and all hull business will be for the year.

If there is anything that is less to the mind of the lake underwriter than another just now it is doubtless the fact that so few American companies will go into the business. The control is entirely in London and it will remain there till it is learned over here that there is more profit in lake underwriting than in covering land property against fire. If present conditions continue this knowledge will not be long coming. One new company entered the lake business last season and there is room, and apparently profit for more. America is doing her own financing in general these days. She ought to control her own insurance.

JOHN CHAMBERLIN.

LARGE PLANT FOR LOADING SOFT COAL.

According to advices from the soft coal district of Cape Breton the improvements which have been made on the large coal dock of the Dominion Coal Co. have been completed and the conveyors are in full operation. The loading was formerly accomplished by railroad cars operated on a two-level system of standard gauge double track, the cars being lowered after emptying on the upper level by means of a drop-table, invented by Mr. Hiram Donkin, resident manager of the company. After being lowered they returned by gravity incline to the inshore end of the dock. This system worked admirably and gave rapid dispatch to vessels in loading, when there was a full supply of coal in the cars; but this is the most expensive form of storage known. After rejecting, on account of expense, a scheme of placing a pocket above the pier, the matter was placed in the hands of the Robins Conveying Belt Co. of New York, which designed and carried out the present installation. This consists of a storage of 10,000 tons in bins under the railroad at the inshore end of the dock and mechanical means for carrying the coal from the storage and delivering it simultaneously into three or four hatches of a steam collier lying alongside the dock. This is accomplished by means of two belt conveyors of large size, the first of which runs through a tunnel under the storage bins, then rises to a height of about 25 ft., at which point it delivers its load to a second conveyor which elevates the coal an additional height of 35 ft. to a point 30 ft. above the track level of the dock. At this height it is carried the entire length of the dock with unloading devices at three or four points, by means of which a part of the coal on the belt can be deflected into chutes which run down to the collier's hatches.

The scope of the operation is only appreciated when it is explained that the regular working capacity of the conveyors is 750 tons per hour and that this quantity of coal can be carried a distance of 1,000 ft. and delivered into a vessel without interfering in any way whatever with the former car system, which can be operated at the same time if desired.

It is said that the total cost of loading the coal by this system, including interest and depreciation, power and labor, is considerably less than one-quarter of a cent per ton.

SHIPMENTS OF ANTHRACITE COAL.

The shortage in the movement of anthracite coal by lake, due to the strike of last summer, is shown in the report of shipments from Buffalo. During 1900 the shipments aggregated only 1,826,091 net tons, against 2,815,165 tons in 1899 and 2,455,191 tons in 1898. Following is a summary showing the ports to which the coal was shipped:

From Buffalo to	1900. Net tons.	1899. Net tons.	1898. Net tons.
Chicago	699,570	1,024,969	1,073,771
Milwaukee	422,530	638,031	534,520
Duluth	201,340	393,373	298,808
Superior	169,595	313,350	215,212
Toledo	49,435	43,517	61,645
Gladstone	17,400	33,571	36,000
Canada	35,122	54,155	40,355
Racine	23,090	34,065	28,680
Lake Linden	27,265	19,790	29,743
Green Bay	24,794	36,502	28,440
Manitowoc	26,680	20,270	23,750
Marquette	12,859	11,645	11,200
Ashland	7,350	7,500	10,550
Sheboygan	13,165	3,300	10,800
Kenosha	3,375	7,475	6,620
Saginaw	.....	2,800	4,920
Bay City	5,415	5,251	4,775
Port Huron	3,100	6,260	4,700
Marinette	290	1,685	1,604
Washburne	1,100	7,800	3,450
Portage	4,475	3,675	7,650
Manistique	.....	2,610	1,500
Hancock	7,450	7,250	3,650
Houghton	405	3,000	2,225
Menominee	850	4,175	1,250
Escanaba	.....	1,500	1,000
Sault Ste. Marie	5,375	10,971	1,600
Grand Marias	.....	300	450
Waukegan	47,020	37,550	1,000
Alpena	1,065	200	125
Grand Haven	.....	.....	700
Marine City	675	800	650
St. Joseph	.....	680	800
St. Clair	.....	540	388
Port Clinton	400	6,260	600
St. Ignace	.....	.....	400
Muskegon	.....	1,350	720
Algona	.....	500	300
Cheboygan	.....	1,830	.....
Pt. Washington	75	.....	.....
Garden Island	675	.....	.....
Marine City	675	.....	.....
Cape Vincent	105	.....	.....
Totals	1,826,091	2,815,165	2,455,191

LAKE COMMERCE OF CHICAGO IN 1900.

Collector Nixon of the port of Chicago furnishes the custom house statistics on the commerce of Chicago for 1900. The total arrivals and clearances of vessels in the district of Chicago during the navigation season of 1900 were as follows, showing a large increase over 1899:

	Arrivals.		Clearances.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Chicago	7,181	4,989,118	7,245	4,976,964
South Chicago	1,241	1,956,062	1,309	2,068,750
Michigan City	207	51,391	205	50,707
Waukegan	85	48,424	80	44,774
Totals	8,754	7,044,995	8,839	7,141,195

The shipments of grain by lake to American ports were: Barley, 392,434 bushels; corn, 67,274,511 bushels; flaxseed, 1,773,061 bushels; oats, 20,392,689 bushels; rye, 249,317 bushels; wheat, 21,053,112 bushels; total, 111,135,124 bushels. Total shipments to American and Canadian ports, 132,681,731 bushels.

Some of South Chicago's receipts during the year were as follows: Iron ore, 2,333,381 tons; salt, 1,270,018 barrels; lumber, 27,344,000 ft; shingles, 9,313,000; coal, 126,795 tons. Shipments were: Flour, 4,600 barrels; wheat, 5,644,046 bushels; corn, 24,885,555 bushels; oats, 5,911,180 bushels; barley, 312,000 bushels; flaxseed and rye, 100,000 bushels; oil, 116,720 barrels; coal, 1,850 tons.

Exports by lake, carried by American vessels to Canadian ports, were valued at $6,688,874; carried in Canadian vessels to Canadian ports, $1,693,582; total value, $8,382,456. These exports consisted of grain, flour, flax seed, provisions, machinery, steel rails, lumber, glucose, oils, oil cake, nails and starch.

REDUCTION IN PRICES OF CHARTS.

A radical reduction in prices of charts has just been made by the United States hydrographic office. Prices of some of the valuable navigators' charts published by this branch of the navy have in some cases been regarded as quite high, and on the great lakes especially the masters of merchant vessels have, on account of the price, often deprived themselves of charts which they could use to advantage. In a general way it may be said that the reduction from old prices is about 50 per cent. Under the law the hydrographic office is required to furnish aids to navigators at a minimum cost. A board was recently appointed in the office to revise prices of all publications issued, in order that the law may be complied with in full. The report of this board has been approved by the hydrographer, and the new schedule went into effect Jan. 1.

Mather & Wood of Port Jefferson, L. I., have taken the contract to build a 90-ft. oyster steamer for parties in Connecticut. Work will commence in a few days.

AROUND THE GREAT LAKES.

John F. Wedow of Cleveland has sold the lumber barge Racine to the Port Clinton Trans. Co., owners of the steamer Leland and barge Montgomery.

Dock No. 1 of the C. Reiss Coal Co. at Sheboygan, one of the largest docks on Lake Michigan, was destroyed by fire Tuesday. The loss, estimated at $60,000, is covered by insurance. The dock will be rebuilt at once.

J. I. Greatsinger has been elected president of the Minnesota Iron Co., to succeed D. H. Bacon, who resigned recently to assume the duties of chairman of the board of directors of the Tennessee Coal, Iron & Railroad Co., in which capacity he will have the management of all departments of the company's business.

Carrol Dane, who conducts a very interesting theatrical column in the Chicago Times-Herald, illustrated and described in a recent issue of that journal the steam yacht Aunt Polly, which was designed by W. J. Wood of Chicago for William Gillette, actor and dramatist. Mr. Gillette was playing in Chicago at the time. He takes great pride in the vessel.

Members of the Cleveland harbor, American Association of Masters and Pilots, have elected the following officers: President, L. T. Brogan; first vice-president, James Higgins; second vice-president, Samuel Moore; purser, C. A. Benham; captain's clerk, James McPherson. L. T. Brogan was elected delegate and James Higgins alternate to the meeting of the grand lodge, which will be held at Washington the latter part of the month.

Officers elected a few days ago at the annual meeting of the Cleveland lodge, Ship Masters' Association, are as follows: President, R. J. Cowley; first vice-president, S. C. Allen; second vice-president, Frank W. Stenton; financial secretary, Olef Olson; recording secretary, Louis Allen; treasurer, Thomas Jones. R. J. Cowley was elected delegate and S. C. Allen alternate to the grand lodge meeting, which will be held at Port Huron Jan. 29.

The lake-built steamer Paraguay arrived at the works of the Eastern Ship Building Co., New London, Dec. 23, with but one blade of her cast iron wheel in position. She made 9 knots an hour up the sound under such unfavorable conditions. She was quickly repaired and proceeded to New York the following day. Her sister ship, the Asuncion, also left the works of the Eastern Ship Building Co. Dec. 24, she having been fitted for ocean work, and the damage caused by collision in the St. Lawrence canals repaired. About a dozen plates had to be removed.

SENATOR HANNA IN THE MAGAZINES.

Senator M. A. Hanna contributes an article on the "Revival of American Shipping" to the National Magazine for January. It is the first contribution he has ever published in any periodical and a summary indicates that his enthusiasm and confidence in the shipping bill has not abated. The article in part reads as follows:

"Forty years ago this nation contended with Great Britain for supremacy upon the sea. In these days, before railroads had gridironed the country, it was to the transportation upon the seas that our people looked with the greatest pride. All of these things have changed. With the disappearance of our ships came the advent of our railroads, transcontinental and otherwise, and our capital was busily and profitably employed in those colossal undertakings, so that we were indifferent to the lack of opportunity for profitable investment in ships in the foreign trade. Just the reverse was the case with our foreign rivals, especially Great Britain. There was neither the opportunity nor necessity for railroad building there that was here. The cost of running ships under the American flag has been computed at between 30 and 40 per cent. higher than the cost of running foreign ships. It is due to the higher wages paid to American officers and seamen and firemen, and to the better quality and larger quantity of food furnished them. The value of the ships that are built in the United States and the value of the men who man them to our navy in time of trouble in itself will more than compensate the United States government, the American people, for all the money they expend in inducing our people to build and to run ships under the provisions of this bill.

"The bill provides compensation for a period not to exceed twenty years and at no time shall the sum so expended exceed in any one year $9,000,000. As soon as enough vessels come into existence to absorb all of this sum, in any one year, each additional ship thereafter built draws from the others in existence a pro rata share in the compensation sufficient to give the latter, size and speed being equal, the same compensation that the others receive. It is not intended to encourage Americans to buy foreign built ships. If the American people can be brought to understand the need and value of an American merchant marine to the nation then the bill now pending makes provision for such an accomplishment. It also provides for its accomplishment by what is considered by those who have studied the question for years the only plan that will practically and quickly establish American ships upon the high seas. This result, it cannot be said too emphatically, will entirely fail of accomplishment unless there is a very substantial reduction in the rates of freight charged for the carrying of our imports and exports, as only by reducing rates can American ships expect to wrest any of the carrying trade from their foreign competitors. There can be no monopoly of any route by any line or class of ships. Every route is open to any American ship that chooses to enter it. Any American may build that type of ship that he believes will be most advantageous to him under the terms in the bill. The pending shipping bill is equitable, honest, scientifically drawn, an automatic measure, destined to place the American flag once more upon the seas to the material benefit of all the American people. The effect of such an accomplishment in perfecting the defenses of the nation will be worth each year the entire cost of the operation of the measure during its entire life."

About 300 ft. of keel is laid for the Hill Pacific liners at New London. A novel feature that is much and favorably commented upon is the fact that two vertical keels are used instead of one. The keel bar is placed flat instead of vertically and the floors are of tremendous depth, the tank or double bottom being sufficient for the tallest man to walk in without bending.

SENATOR ALDRICH ON THE SHIPPING BILL.

Senator Aldrich of the Republican committee on order of business of the senate has given out the following interview on the shipping bill:

"I have not examined the bill closely, but it is in line with the principles of the Republican party and is advocated by the administration, and the necessity of some such legislation is unquestionable, and for that reason I think the bill will pass. Our merchant marine in the foreign trade has been declining year after year, with rare exceptions, and if there was ever a time under existing conditions when it should have increased last year was that time. And yet it decreased last year. It is entirely clear that something must be done or we will practically be, before long, without any merchant marine in the foreign trade. There is some difference of opinion as to what should be done, but, as I understand it, there is no difference whatever, at least among Republicans, as to the necessity of doing something. I do not see anybody who is opposing this measure offering anything better. It is like a tariff bill. We hear a great deal of outcry against such bills, but we never get any substitutes excepting those offered by free traders and Democrats, which would be utterly ruinous to the country. The only substitute that I know to the existing bill is the free ship bill offered by Mr. Vest. There is just the same difference between the bill reported by the senate committee on commerce, and the free ship bill offered by Mr. Vest, that there is between the Republican tariff bills and the Democratic free trade bills. We have got to the pass when something must be done not only to preserve what little shipping we have in the foreign trade but to increase it. The bill before the senate may perhaps be amended to advantage. I cannot tell fully as to that. But we need some bill and this one is the best bill on the subject that has been brought before congress, and I think that it will pass. This talk about growing opposition to the bill on the Republican side reminds me of the kind of talk we used to hear about the weakness of our tariff bills and how they would be defeated. There is nothing in such talk."

PART OF MOSQUITO FLEET GOES TO THE PHILIPPINES.

Within the next few days three little ships of war will start from the Atlantic seaboard on the long voyage to Manila. They compose part of the "mosquito fleet" assigned to the Philippines in accordance with the determination of the government to draw a tight cordon of vessels around the perturbed islands to keep the insurgents from receiving supplies from the outside. The vessels are the Annapolis, the Frolic and the Wompatuck. Only one, the first named, was built for war purposes. The Frolic was a yacht, and the Wompatuck is a big, seagoing tug. The Frolic and the Wompatuck have been fitted as gunboats and will be valuable additions to the blockading force in the Archipelago. All three are now in Hampton Roads, coaled and otherwise supplied and ready to start when word comes from the navy department. On account of the dangers to small vessels on such a long voyage the little squadron will divide its trip into runs as short as possible. It will go to the West Indies, thence to the Cape Verde islands and thence to Gibraltar. The cruiser New York, which is being fitted at the Brooklyn navy yard for service in the far east, will leave this country about March 1. She will carry Rear Admiral Frederick Rodgers, whose flagship she will be. On his arrival at Manila Admiral Rodgers will arrange with Rear Admirals Remey and Kempff for a division of duties among the three.

KINGSFORD MARINE BOILERS.

In one of the neatest pamphlets of the new year, the Kingsford Foundry & Machine Works of Oswego, N. Y., illustrates and describes a dozen or more types of marine boilers which they build for crafts of all kinds and sizes. In connection with a large new boiler plant, equal to the best in the country as regards equipment, the Kingsford company operates an extensive machine shop and foundry and makes a specialty of centrifugal pumping machinery and marine engines of high pressure and compound types. In boilers for tugs, yachts and river craft they have a very large trade. The "compact" marine boiler is one of their designs which is patented. It is intended especially for use with the smaller powers in tugs and yachts, where little space is available. This boiler has a crown sheet circular in form, and there are, therefore, no braces over the fire, the form of sheet making it self-sustaining. The value of this form of construction is appreciated when washing out, as a perfectly smooth surface is met with. The Kingsford officials say they can furnish the same amount of heating and grate surface in boilers of this type as is usually found in water tube boilers occupying the same room. It is a quick steamer and was adopted by the United States government for use in fog signal stations on the lakes, where upwards of thirty for this purpose alone have been supplied. This type of boiler can be furnished with from 100 to 1,500 sq. ft. of heating surface and to carry 160 lbs. of steam or less, and is fitted with single or double furnaces.

The torpedo boat destroyer Bailey failed to attain her contracted speed of 30 knots on the measured mile during her official trial, Dec. 21, and the trials have been postponed until after the holidays. Mr. Seabury stated that the trouble was caused by inferior coal and he has ordered hand picked Pocahontas, which he feels convinced will give all the steam required to make the contracted speed for a period of two hours. On the official trial in question a speed of 29 knots could not be maintained during a run on the mile owing to dropping steam pressure. It is said that the Bailey made 31 knots on her unofficial builder's speed tests.

Operators of blast furnaces in the Shenango and Mahoning valleys on Monday decided to reduce the wages of furnace workers, the average being about 15 per cent. The reduction is to be made Feb. 1 and will affect about 2,000 men. The furnacemen have contended that the wages were out of all proportion to the price of pig iron. They say that the new scale will be the same as that in effect in March and April, 1899, before the market had made the sharp advance of the boom. Before the boom top-fillers made $1.35 and $1.40 a day. The wages now are $1.80 a day. The reduction will make them about $1.50.

American Bridge Co.

General Offices, 100 Broadway,
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DESIGNERS AND BUILDERS OF ALL CLASSES OF METALLIC STRUCTURES.

We have decided to carry at all our plants a large stock of Raw Material, from which we can furnish with great promptness any ordinary order for Steel Bridges, Roofs, Buildings, Columns, Girders, Beams, Channels, Angles, Plates, etc., etc.

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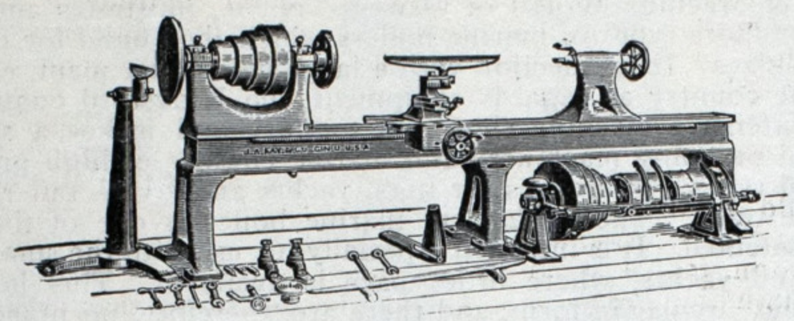
PENCOYD, PA.
PHILADELPHIA, PA.
PITTSBURG, PA.
ROCHESTER, N. Y.
SALT LAKE CITY, UTAH.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
SIDNEY, N. S. W.
TRENTON, N. J.
WILMINGTON, DEL.
YOUNGSTOWN, O.

A NEW PATTERN MAKERS' LATHE.

There is illustrated herewith a machine just brought out by J. A. Fay & Eagan Co. of Nos. 325 to 345 West Front street, Cincinnati. This machine, which has an iron bed, will be found invaluable in woodworking establishments, and has double face plates, movable carriage rest, foot post and floor stand. It is capable of swinging 30 in. and is constructed as strongly as possible. The spindle is of large diameter, lead



NEW 30-in. PATTERN MAKERS' LATHE.

ground and fitted with a 12-in. face plate on one end and an 18-in. on the other. The outside face plate is clear of the end of the shears and will allow turning extra large circles.

The tail stock is operated by hand wheel and screw and locked by a hand wrench, and is absolutely true with the head stock. The movable carriage is gibbed to the shears and supports a cross slide which carries the rest and tool post. It is moved by rack and pinion feed, operated by a hand wheel and is very useful in turning cylinder patterns and other long material. This machine will be supplied with or without the bed. The manufacturers will furnish prices and full particulars on application, and will also forward their large new illustrated poster free.

WHAT IS LLOYD'S?

In reading the daily and weekly papers one often runs across the term "according to Lloyd's," but it is probable that very few know the extent of Lloyd's functions in the insurance world. Hence it is that an article which recently appeared in Ainslee's Magazine is particularly apropos as helping to answer the question, What is Lloyd's? Thus the writer of the article, S. A. Woods, says most members of Lloyd's carry on business as brokers or underwriters on their own responsibility. As a corporation Lloyd's assumes no financial liability for the failure of any of its members or subscribers. But it admits to membership only men of reputation and means, who must deposit a pecuniary guarantee in order to become an underwriter and underwriting member, an annual subscriber or an associate. An underwriting member must deposit with the committee of Lloyd's £5,000 or £6,000, on which he receives interest, and which may be returned to him three years after he ceases to be an underwriting member. He pays an entrance fee of £4,000 and an annual subscription of 20 guineas. An annual subscriber pays no entrance fee, but an annual subscription of 7 guineas; an associate member pays 5 guineas.

There were in 1771 only seventy-five subscribers to Lloyd's. There are now nearly 1,000. The subscribers in the olden time, as now, did not confine themselves to marine insurance. They were willing to take a risk on almost anything. There is still preserved in Lloyd's a policy on the life of Napoleon Bonaparte for one month at a premium of £3 3s. per cent. Bank deposits are insured in Lloyd's; also race horses, and the lives of threatened monarchs. An odd case was the covering of a risk on a glass bed packed in twenty cases for a certain sultan. Lloyd's insured the prince of Wales jubilee stamps, guaranteeing that the issue would be successful. The voice of a prima dona has been insured. A tradesman in a London street, who has an impression that a monument may fall on his shop, has taken out a policy at the nominal premium of 2s. 6d. per cent. Gate money for cricket and football matches; animals of all sorts, ashore and afloat, are subjects for insurance; policies against twins is a favorite form of insurance. A well-known underwriter is said to be always ready to lay a thousand to one against twins. Lloyd's issues insurance against burglary. Elephants are insured regularly. The life of the great Jumbo, who came to New York on a Monarch line steamship, was insured in Lloyd's for the voyage to New York. He was not insured when the life was knocked out of him by a locomotive on an American railroad whose tracks he was crossing. A celebrated singer recently took out an insurance in Lloyd's on the life of Queen Victoria. She paid a big premium on account of the age of the queen. The reason the singer did this was because her contract to sing would have been abrogated by the queen's death, which would have plunged England into mourning and prevented the singer's appearance in opera.

TRIBUTE TO THE TRIGGS.

Mr. Henry Scott of the Union Iron Works, San Francisco, has the following to say of the William R. Trigg Ship Building Co., Richmond, Va.:

"Recently I visited Richmond and thoroughly looked over the plant of the Wm. R. Trigg Co., and was surprised at its broadness of conception, the general arrangement of building and the high standard of tools, comparing, in my opinion, favorably with any ship yard plant in America. While not of the vastness of Newport News or Cramps', their tools and buildings for the work are equally as good. As regards economy in construction of the whole general plan, I was perfectly surprised, and believe I am understating, rather than overstating, when I say that it is the most concrete ship building plant I have ever seen, with the greatest economy in construction, so that when they are finished they will have a first-class works with the smallest possible outlay consistent with good machinery and good work, and it reflects credit not only on the builders, but on the city and state where it is located. With that great loyalty which seems to exist in the city of Richmond, I can speak for its continued prosperity."

BELLEVILLE GENERATORS

Grand Prix 1889 — Hors Concours 1900
Originated 1849 — Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynesien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890	22,576	820									
1891	22,749	22,777	68								
1892	22,749	22,801	23,274	7,753							
1893	22,793	22,781	22,762	22,749							
1894	22,813	22,789	22,858	22,813	12,567						
1895	22,891	22,922	22,913	22,936	13,629	9,571					
1896	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE, ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

MONTREAL IS BADLY DISAPPOINTED.

The Montreal Journal of Commerce in its latest issue makes an attack upon the W. J. Conners syndicate for its delay in carrying on its elevator building and the scheme of grain transportation for export by way of the St. Lawrence canals. The Journal declares that many Canadians believe that Mr. Conner's scheme was proposed only for the purpose of preventing the development of the St. Lawrence river route. It says that if there is deception the sooner it is known the better. Continuing the Journal says:

"With regard to the Conners syndicate, when all the circumstances connected with its advent here are considered it is not at all surprising that many of the best and most sanguine friends of the St. Lawrence route should feel anxious about the doings of that organization. The principal men who first formed the syndicate came here from Buffalo, a place which might well be supposed to be antagonistic to Montreal and the St. Lawrence route generally. By some means they soon gained the ear of the harbor board and the government and the syndicate got possession of a contract which gave them special privileges and grants in the harbor and a free grant of the only immediately available site on which a grain and package elevator could be built was granted them. The conditions for which these valuable privileges were granted appeared on the surface to be very stringent, but they do not appear to be effective as far as the general purpose is concerned.

"Two years have now passed and no practical results have followed. Looking at the position from a common-sense, business viewpoint, nothing has been done by the syndicate to promote the expansion of the trade to the St. Lawrence route. This, it was expected, would follow the special privileges given to its members, that were valued by themselves at $1,500,000, which amount was to be for the benefit of the promoters of the company it was proposed to form to take over the business contracted to be carried on by the syndicate. That was the syndicate's estimate of the value of the privileges given by the harbor board and the government. So far as we know, however, and so far as the public is aware, the shares in the proposed company have not been subscribed for nor paid for.

"From this circumstance many of those interested in the trade are feeling anxious about the present condition of these matters. The work, which has been allowed to drag along at an unreasonable pace, has now stopped. 'Will it ever be resumed?' is the natural question that comes to many both inside and outside of the harbor board.

"This Journal has frequently expressed the opinion that in the main the object aimed at in this Conners agreement would be advantageous if carried out according to its spirit. Now, it must be said that appearances are not favorable that it will be carried through in good faith. It was always expected that a company would be organized for promoting and completing this project, which involves millions of dollars. That company and the necessary capital have not yet materialized as far as we are aware, and yet it is the groundwork from which progress will start.

"We have no desire to deal in a harsh spirit with this matter, although it involves the most vital interests of the Dominion from a transportation viewpoint. But we have this to say, that if, as many people are now inclined to think, the whole movement was one for the purpose of preventing Canadians from taking steps to expand the trade of the St. Lawrence as a consequence of the completion of our inland waterway to a depth of fourteen feet, the sooner the whole deception is swept away the better. Then others will step forward and the country will have the benefit of trade, to obtain which so much public money has been expended. The syndicate appears to have got on its high horse when questioned as to the future. We suggest that it is only reasonable that the interested public should know at this time if the company which is to handle the business has yet been organized or is likely to be organized. That is a pertinent question, for on it hinges the whole matter. If the project is to fall through the sooner it is known the better, so that others may use the valuable privileges that have been given away. Frankness in dealing with this important matter is all important."

ELECTRICAL EQUIPMENT OF THE VADERLAND.

The electric light and power equipment of the Red Star line steamer Vaderland, built by John Brown & Co., Glasgow, and which was described and illustrated in the last issue of the Review, was supplied by the Electro-Dynamic Co. of Philadelphia. The Philadelphia company not only supplied the dynamos, motors and construction material, but also the electric speed and rudder indicators; in fact they furnished everything that went toward making up the electrical equipment excepting the engines and blowers, which they purchased from the B. F. Sturtevant Co. of Boston, and the push buttons for the electric bells which were supplied in England. The annunciators were furnished by the Philadelphia company. In addition to the equipment for the Vaderland, the Electro-Dynamic Co. is also furnishing the electrical equipment for the Zeeland, a sister ship, and for the Haverford and Merion, two other large steamers now nearing completion on the Clyde for the same owners.

The navy department has purchased for $900 in gold, a small island in the harbor of San Luis d'Apra, Guam, with a view to its use as a site for a naval coaling station. The island is 130 acres in extent and is said to be well adapted to its proposed use. It belonged to several prominent natives of Guam.

Paris Exposition, 1900, confers Highest Award and 2 Gold Medals ON CHICAGO PNEUMATIC TOOL CO.

(Only Gold Medals in this Class.)

HAMMERS
for Chipping
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RIVETERS
for Shipyard use
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" Bridge work
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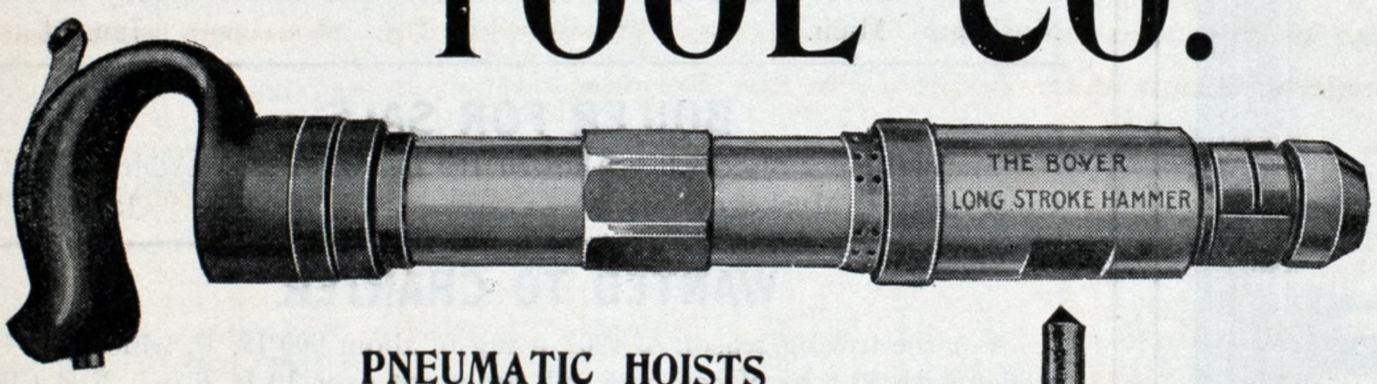

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for Railroads
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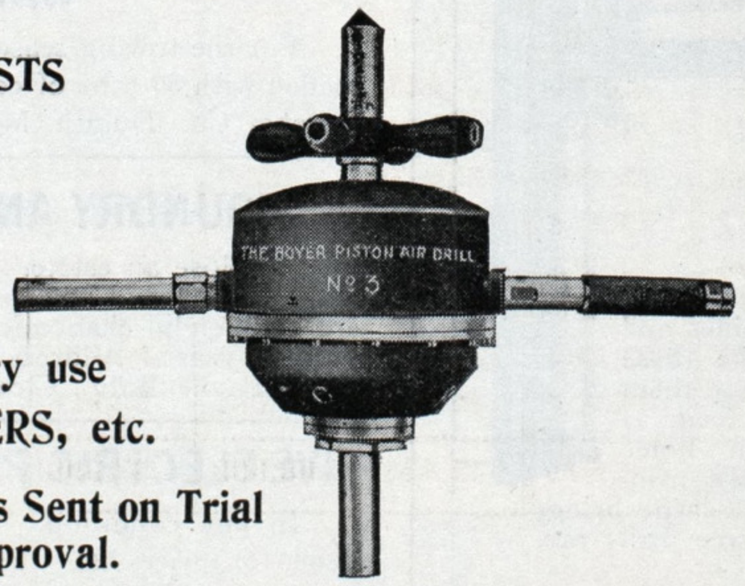
PNEUMATIC HOISTS
CRANES
JACKS (Car and Locomotive)
PAINTING MACHINES
MOTORS for every use
CASTING CLEANERS, etc.



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By actual statistics 95% of all Pneumatic Tools sold all over the world are our tools.

UNITED STATES COMMISSION
TO THE
PARIS EXPOSITION OF 1900

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PARIS OFFICES,

August 21, 1900.

Chicago Pneumatic Tool Company,

Chicago.

Gentlemen:

Officially I desire to inform you that your pneumatic tools received at the hands of the International Jury of Award, a Gold medal. Also that Mr. Boyer was awarded a Gold Medal as collaborator and inventor of the tools.

Yours very truly,

F. E. Drake

Director of Machinery & Electricity.

New York Office: 95 LIBERTY ST. — **CHICAGO PNEUMATIC TOOL CO.** — **GENERAL OFFICES: Monadnock Block, Chicago.**

BRANCH OFFICES: 418 Exchange Building, Boston, Mass. 241 The Arcade, Cleveland, Ohio. Binz Building, Houston, Texas. 316 Lincoln Trust Building, St. Louis, Mo. 1016 Carnegie Building, Pittsburg, Pa. 421 Market Street, San Francisco, Cal. 605 Fidelity Building, Philadelphia, Pa.

FOREIGN REPRESENTATIVES: The New Taite-Howard Pneumatic Tool Co., Ltd., General European Agents, 63 Queen Victoria Street, London, E. C. John Macdonald & Son, No. 9 York Street, Glasgow. Schuchardt & Schutte, Spandauer-Strasse 59-61, Berlin, Germany; Brussels, Belgium; St. Petersburg, Russia; Vienna, Anstria; Stockholm, Sweden. H. Glaenzer & Perreaud, 1 Avenue De La Republique, Paris, France and Spain. H. W. Peabody & Co., Sydney, New South Wales.

TRADE NOTES.

The Safety Car Heating & Lighting Co. of New York is finding quite a demand for its gas buoys among dredging concerns. Ten or twelve of the buoys are leased to dredging companies that are carrying on large operations on the Atlantic seaboard.

A pamphlet descriptive of the Whitney gravity hot water steam boiler feeder with automatic (self acting) attachment and improved precipitating heater is worthy of attention from vessel owners, as it is adapted to marine boilers. It is manufactured by the University Mnfg. Co., Thomas J. Whitney, treasurer, 45 N. Second street, Philadelphia.

The Garlock Packing Co., Palmyra, N. Y., informs us that their business for the year just closed has been the most successful in the career of the company and with the new year, with increased facilities, they expect to still further extend their business. They have published a handsome calendar which they will be pleased to send to any engineer writing for it.

The Olds Motor Works, Detroit, Mich., reports that the demand for marine motors for pleasure crafts in the south is something unprecedented in the history of their concern. They have been shipping numerous orders to Florida and Washington, D. C., for resort trade for the past month and the demand is increasing continually. They also say that inquiries for gasoline marine engines for next spring's delivery are more numerous than ever before at this season of year.

Here's a catalogue that is more than a catalogue. It contains a treatise. If all manufacturers sent out catalogues that were as inviting in appearance and as readable in contents as the new catalogue on the Webster system of steam circulation for heating purposes, just published by Warren Webster & Co., Camden, N. J., there would be less complaint on the part of catalogue users that the waste basket is the beginning and end of a customer's interest in such literature. This new catalogue of this well known firm is a fine piece of bookmaking, with artistic cover page in green and gold and a natural tint, the inside printed on fine antique stock in two colors, with all the illustrations in genuine photogravure. We do not remember having seen a handsomer piece of printing. The contents, descriptive of the Webster system, as it is known everywhere, is written in a clear, clean, forcible style, with very little that is technical, and reads as easily and is as entertaining as the talk of a clever salesman. Surely the logical way to look at the catalogue question is to say that it is a silent salesman—well dressed, informing, an easy-to-read and easy-to-remember talker. Such is a good catalogue, and for these and other reasons that will appear readily to the man who reads the book, this Webster catalogue is a good piece of advertising. Every engineer or architect should have one, for it contains something new and strong on the heating problem.

The Lake Shore Stone Co. of Milwaukee has purchased from E. G. Crosby of Muskegon, Mich., the tug Kate Williams and two large scows.

CREWS FOR THE SUBMARINES.

The navy department expects that the six submarine torpedo boats of the Holland type, now under construction, will be finished in April and May. It will then be necessary to man them, and the bureau of navigation is giving attention to the question of securing competent crews. There appears to be a concurrence of views among the naval officials that men who enlist for service in the navy should not be assigned to such dangerous work as that of operating submarine boats without their consent, and the navigation bureau will recommend that special service enlistments for these vessels be authorized. A memorandum explaining the necessity of enlisting men especially for the hazardous work is being prepared by the navigation bureau and it will be submitted to President McKinley by Secretary Long. The memorandum suggests that these men receive additional pay. The Holland, now in service, has one officer, three gunner's mates, one chief electrician and one warrant machinist to run her.

THIS ILLUSTRATES OUR

Standard Wall Radial Drill

with which we are having unprecedented success.

We are selling a large number of these machines and they are giving universal satisfaction. We make these drills in lengths of arm from 6 ft. to 15 ft., and equip them with hand wheel feed, lever feed, or automatic feed, as desired. Capacity of this drill is forty 1½-in. holes drilled to a depth of 2½ in. in three hours in cast iron. We recently installed eighteen of these drills in a large bridge shop after they had made a thorough test of three drills previously purchased by them.

Let us have your inquiries for this machine.

The Cleveland Punch and Shear Works Co.,

CLEVELAND, O., U. S. A.

GARLOCK PACKINGS.

Made on the Right Principle.
Made for Service.
Made for Durability.
Made for Economy.

Hence of practical utility. Models of simplicity in use. Used for a quarter of a century by thousands of careful engineers in every section of the world. Highly recommended by ALL who have used them. Beware of base imitations. Unprincipled manufacturers try to imitate our packings, and are using our trade cuts to advertise their inferior goods. Write direct to our nearest office, stating your wants, and they will be attended to promptly and faithfully.

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ON SHIP BUILDING.

STANDARDS IN ENGLAND AND SCOTLAND

KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel."
(Plates in separate volume.) $5.25.

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(Plates in separate volume.) $3.00.

"Theoretical Naval Architecture."
(Plates in separate volume.) $3.50.

THE MARINE REVIEW PUB. CO, CLEVELAND.

NAPHTHA LAUNCH WANTED.

For delivery purposes in one of the harbors of Lake Erie. Address Box 411, The Marine Review Pub. Co., Perry-Payne Bldg., Cleveland, O. Jan. 10

MARINE ENGINES FOR SALE.

One fore-and-aft compound 28 and 50x42 in. stroke. One fore-and-aft compound 27 and 50x40 in. stroke. Address E. G. Crosby & Co., Muskegon, Mich. Jan. 24

BOILER FOR SALE.

Marine boiler 8½x16 ft. Allowed 109 lbs. of steam. Address E. G. Crosby & Co., Muskegon, Mich. Jan. 24

WANTED TO CHARTER.

For the towing season of 1901, a tug of about 200 H. P. which can be loaded with 50 tons of coal and will draw not over 10 ft. 6 in. Red Cliff Lumber Co., Duluth, Minn. Dec. 20, Jan. 3, 17.

FOUNDRY AND MACHINE SHOP FOR SALE.

To close an estate. Located in one of the large cities on the lakes. Long established, well equipped, doing good business, marine and general. Splendid chance for the right parties. Will sell plant or lease for a term of years. Address "Administrator," care Marine Review Pub. Co., Perry-Payne Bldg., Cleveland. tf.

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf

WANTED TO PURCHASE, RENT OR CHARTER.

Tug and scows, capacity of the latter to be 1,000 to 1,500 tons. Steam-barge owners correspond. Stone to be transported from our pier at Stone Haven, 7 miles north of Port Washington, to Lake Michigan ports. Lake Shore Stone Co., Belgium, Ozankee Co., Wis. tf